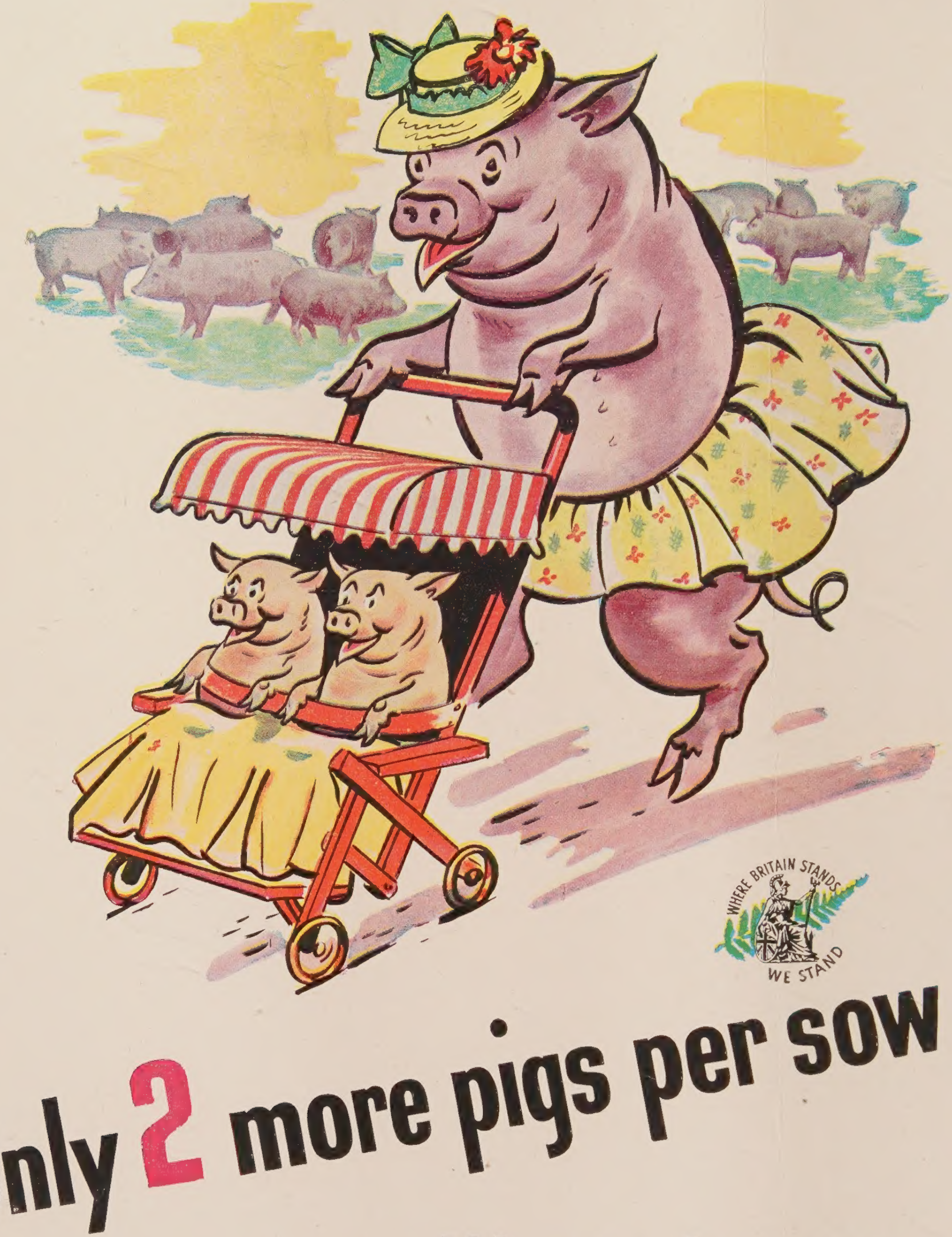
NEW ZEALAND
JOURNAL OF

Agriculture

JUNE
1948

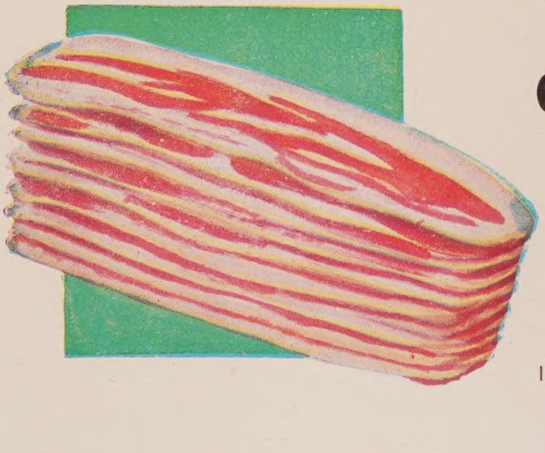
L. S. MITCHELL

COMMONWEALTH MYCOLOGICAL INST
AUG 194



WHERE BRITAIN STANDS WE STAND

Only 2 more pigs per sow



will produce an extra 240 million British Bacon Rations

ISSUED BY THE AID FOR BRITAIN NATIONAL COUNCIL

Volume 76
Number 6
June 15,
1948.
(Established 1910)

NEW ZEALAND
JOURNAL OF
Agriculture

Published by
Direction
of
Hon. E. L. Cullen,
Minister of Agriculture.

This month's cover

In an endeavour to create in New Zealand a replica of the countryside of their homeland many of the Dominion's early settlers planted numbers of deciduous trees common in rural Britain. The group of old black poplars shown on this month's cover, which was painted by L. C. Mitchell from a photograph by Geo. Chance, F.R.P.S., Dunedin, lends beauty to part of a country road in the Roxburgh district, Central Otago. Problems of erosion and timber shortage in New Zealand at present have placed greater emphasis on the need for more extensive planting of trees, which is an obligation those of today have to future generations.

•

New Zealand Department of Agriculture

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington

DIRECTOR-GENERAL:
E. J. Fawcett

ASSISTANT DIRECTOR-GENERAL:
R. B. Tennent

DIVISIONAL DIRECTORS:

Animal Research	J. F. Filmer
Dairy	H. A. Foy
Fields (acting)	J. W. Woodcock
Horticulture	W. K. Dallas
Livestock	W. C. Barry
Rural Development	P. W. Smallfield

Editor: R. E. Owen

TABLE OF CONTENTS

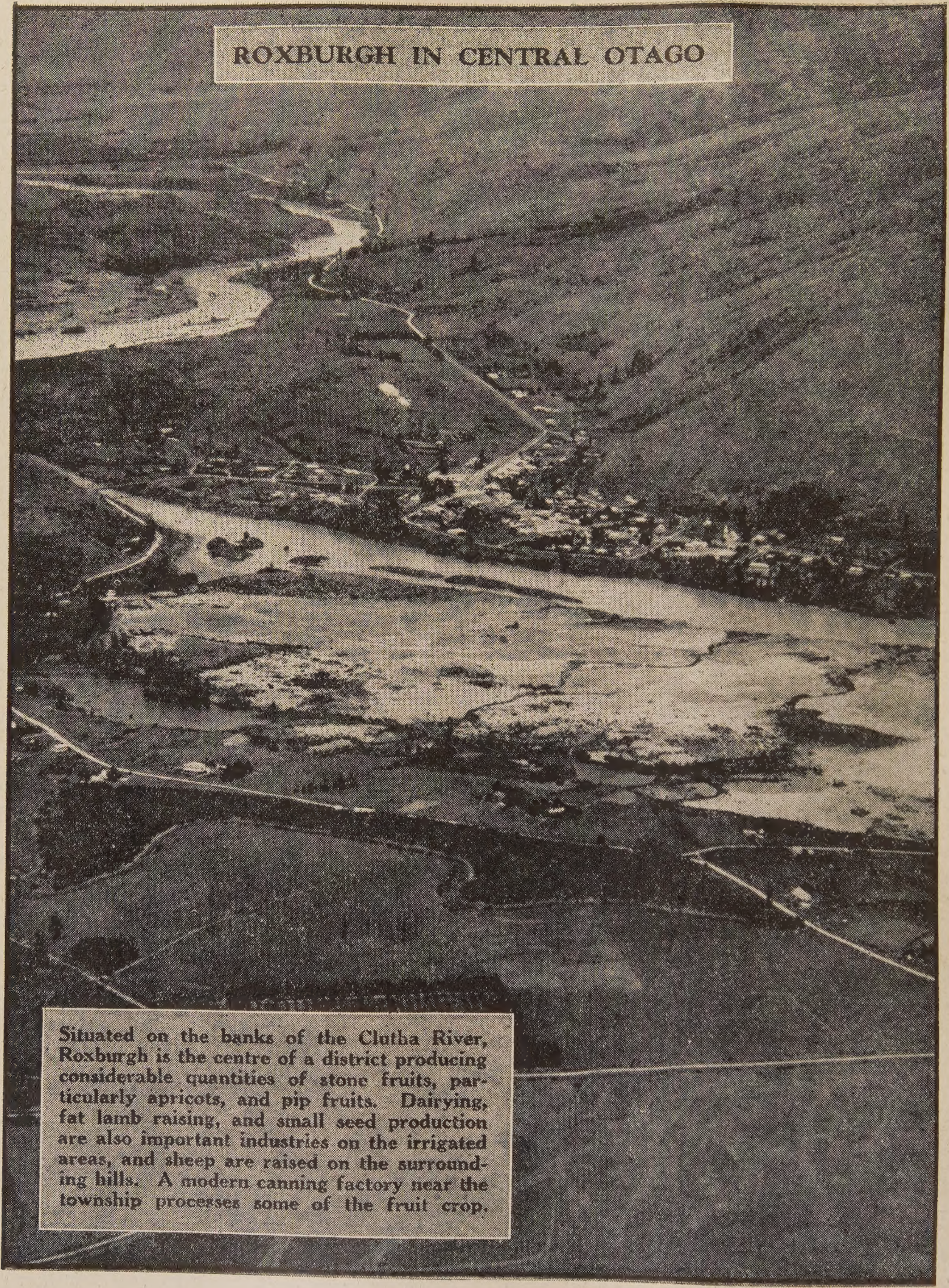
World Shortage of Oils and Fats Continues 515
Care of Equipment Leads to Efficiency in the Orchard .. .. I. L. Nottage .. 517
Stock Losses from Transit Tetany are Costly .. W. D. Ross .. 519
Improving Pastures in Otago and Southland .. A. Stuart .. 523
Poultry Farm Food Stores Need Careful Planning S. G. Haddon .. 527
Clovers—the Key to High Pasture Production .. P. R. Barrer .. 529
Calf Scours Losses a Drain on Production .. W. H. Bishop .. 532
The Home Garden .. .. A. G. Kennelly .. 533
Spread of Winged Thistle in Waikato Pastures J. E. Davies .. 540
Preparing and Packing Colonies of Bees for Transport .. .. I. W. Forster .. 541
A Portable Coil Winder for Fencing Wire .. A. R. Dingwall .. 543
The Rearing of Young Farm Animals .. .. J. Mullins 545
Farming in New Zealand: North Auckland Peninsula .. .. E. B. Glanville .. 549
A Small Holding of Sub-tropical Fruits .. A. T. J. Watts .. 559
Farm Work for July 562
Farming in New Zealand: Intensive Grassland Farming .. .. P. W. Smallfield .. 563
Spur Pruning of Fruit Trees .. .. .. A. R. Grainger .. 581
Feeding Cows to Avoid Milk Fever and its Complications .. .. J. C. Gerring .. 582
Radio Broadcasts 582, 589
Control of Manuka in the King Country .. E. G. Stainton .. 583
Importance of Good Litter Production .. A. Longwill .. 587
Pedigree Sow Records 588
Care of Livestock During July 591
Sacks and Plaster Used to Make Shed .. .. A. J. Lynch .. 592
Home-made Rope Maker One of the Most Useful Gadgets on the Farm .. .. .. H. A. Arthur .. 593
Growing Tulips for Pleasure and Profit .. J. P. Hudson .. 595
A Magnificent Gift .. .. "Mary" 601
Scone Mixture for a Variety of Dishes .. Eva Topping .. 602
The Flower Garden .. .. J. P. Hudson .. 607
Fascinating Fabric Patterns from Linoleum Blocks Louise Tilsley .. 613
Extending and Modernising a Four-roomed Cottage .. .. Dorothy Johnson .. 619
Laundry Layout .. .. Norma K. Metson .. 621

SUBSCRIPTION RATES

The *Journal* is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The *Journal* may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available at 3d. a copy, post free.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

ROXBURGH IN CENTRAL OTAGO



Situated on the banks of the Clutha River, Roxburgh is the centre of a district producing considerable quantities of stone fruits, particularly apricots, and pip fruits. Dairying, fat lamb raising, and small seed production are also important industries on the irrigated areas, and sheep are raised on the surrounding hills. A modern canning factory near the township processes some of the fruit crop.

[V. C. Browne photo,

WORLD SHORTAGE OF OILS AND FATS CONTINUES

I HAVE received from the International Emergency Food Committee of the United Nations Food and Agriculture Organization a tentative schedule of the allocation of oils and fats (excluding butter) for 1948. It illustrates the degree of world shortage of these commodities, the seriousness and importance of which are second only to those of cereals. Not only is a shortage of fats in itself a serious dietary deficiency, but it has numerous indirect effects. For example, in the United Kingdom fish is generally resonably plentiful, but the lack of fat for frying renders it a somewhat monotonous and uninteresting food. In Europe farmers depend very largely on concentrates for livestock feed, especially for dairy stock, and oil-cake is one of the most popular and valuable of these. The acute shortage of this commodity has thus been a contributing factor to the shortage of dairy products and meat.

Greater Population, Less Production

Total world production of visible fats in 1947 was estimated at 10.2 million tons, compared with 12.8 million tons pre-war, in spite of an increase of some 150,000,000 in world population during the past nine years. The position is, however, even more serious than these figures indicate because of the maldistribution of existing supplies. Thus in 1946 consumption levels did not, in many countries, reach 50 per cent. of pre-war levels, and in few European countries was it more than 60 per cent. Preliminary estimates reveal little, if any, improvement for 1947.

New Zealand, as one of the principal exporters of butter, is vitally concerned with the fats situation. During the years 1941 to 1945 New Zealand butter represented from 60 to 70 per cent. of total United Kingdom butter imports, and this Dominion is still the major source of Britain's supply. In 1947 New Zealand exported 120,309 tons of butter to Britain, or 55.6 per cent. of the total imported. Other countries, principally Australia and Denmark, provided the remaining 44.4 per cent. (95,982 tons).

Meagre British Ration

Nevertheless the British ration averages only 2oz. per head weekly. The fat ration includes a further 4oz. of margarine and 1oz. of cooking fat. This illustrates very clearly the necessity for every possible effort being made to increase the Dominion's dairy production. In this connection I am pleased to note that production of creamery butter for the first seven months of the present season (July 1, 1947, to January 31, 1948) is 109,916 tons, compared with 100,796 tons for the corresponding period last season.

Butter, however, is not the only fat in which New Zealand is interested as a producer. As a large exporter of meat the Dominion always has a considerable surplus of tallow and lard. At present practically all supplies above local requirements are sold to Britain under contractual arrangements. I would urge upon farmers and others the necessity for saving all the fat they possibly can to assist in alleviating the present serious shortage in Britain.

Vegetable Oils

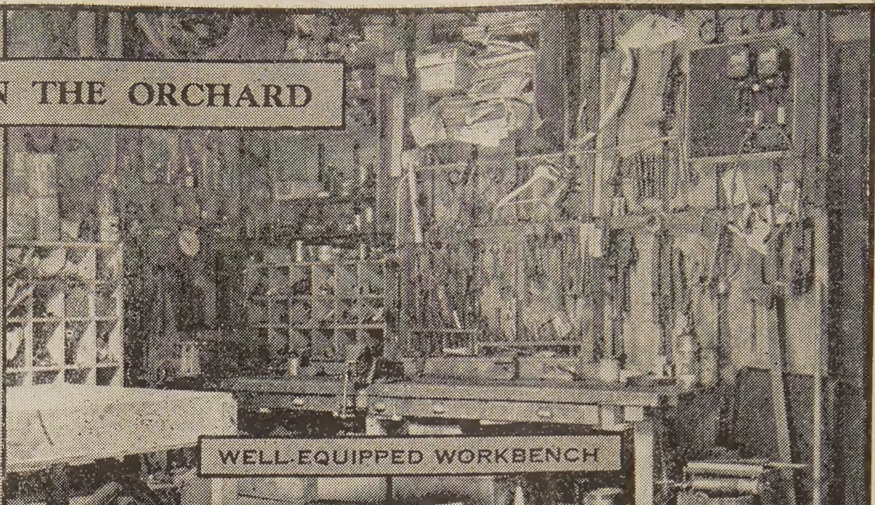
There is also a shortage of certain vegetable oils, one of the most important of which is obtained from linseed. Linseed has been grown in New Zealand for some considerable time, but mostly in relatively-small quantities. In the 1946-47 season 12,292 acres were sown for harvesting, but despite this, even when allowance is made for the supplies of seed obtained from linen flax, there is still insufficient to meet New Zealand's industrial requirements. Plant is now available for extracting all New Zealand's linseed oil requirements, and only the seed is required. A target of 30,000 acres has been set for 1947-48, the attainment of which would go a long way toward making the Dominion self-sufficient in linseed oil requirements.

The British Overseas Food Corporation has begun the development of the ground-nut industry in vast hitherto-undeveloped areas in East Africa, but considerable time must elapse before production reaches worth-while dimensions. In the meantime much can be done by eliminating known waste of oils and fats. In its 1947 Fats and Oils Review, the Food and Agriculture Organization enumerates the more serious forms of wastage, ranging from poor animal husbandry over the greater part of the world and primitive and inadequate methods of collecting and processing oil seeds to widespread consumer waste in countries with the highest living standards. The popular New Zealand practice of saving fat and sending it to friends and relatives in Britain is highly commendable and could be extended even further.

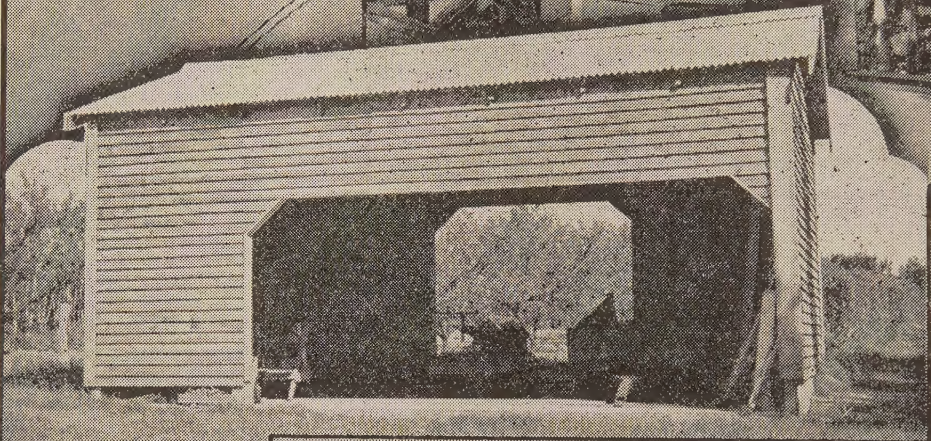
Fortunately situated as we in New Zealand have always been regarding supplies of oils and fats, with an adequate butter ration and all other edible fats and soap in plenty, the Government is anxious to do everything possible to assist people less happily situated, and in particular those of our best customer, the United Kingdom. All can assist in this, consumers as well as farmers. Only through complete world recovery can we in New Zealand maintain the high standards we now enjoy. On grounds of self-interest and common humanity alike, our obligations are clear.

EDWARD CULLEN, Minister of Agriculture.

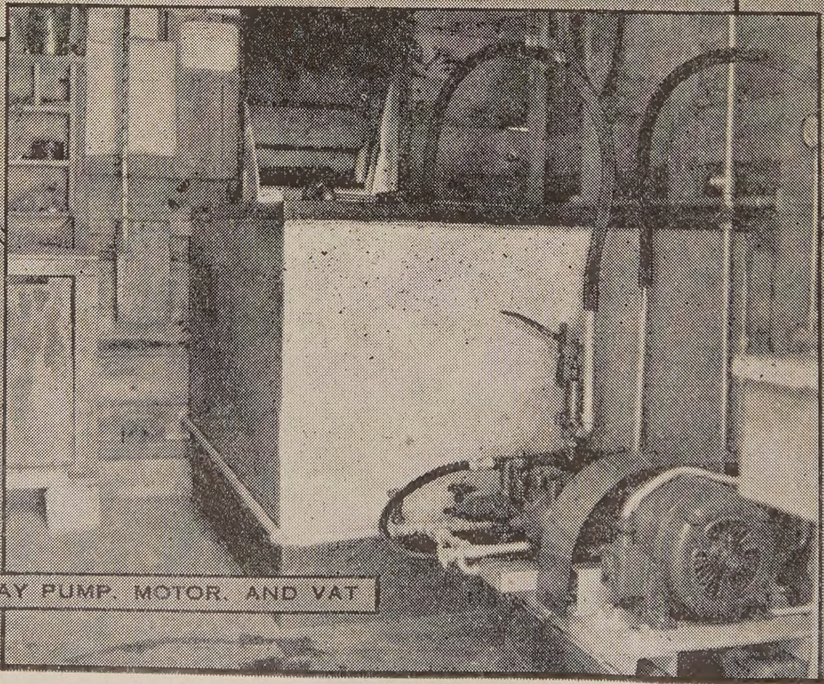
EFFICIENCY IN THE ORCHARD



WELL-EQUIPPED WORKBENCH



BULK STORAGE AND SHELTER FOR FIELD IMPLEMENTS



SPRAY PUMP, MOTOR, AND VAT

[Sparrow Industrial Pictures Ltd. photos.

Care of Equipment Leads to Efficiency in the Orchard

By I. L. NOTTAGE, *Orchard Instructor, Auckland.*

RAPID deterioration of all kinds of farm and orchard equipment, hasty last-minute attempts to repair urgently-needed implements or machines, and exasperating searches for lost or mislaid tools are numbered among the trials and tribulations of far too many farmers with a fatalism almost suggesting that they are unavoidable hardships.

FEW farmers question the desirability of maintaining machinery and tools in good condition, always protected from sun and rain when not in use, always ready for service at short notice. Almost all agree that ultimate economy in time and labour is effected by maintaining the efficiency of implements and tools. Nevertheless, comparatively few acquire or continue to practise the orderly habit of returning all equipment in working order, and reasonably clean, to its appointed place after it has been used. Yet, though "fussiness" wastes time, cleaning up after each job usually makes the next one easier and quicker.

The photographs from which the illustrations on the opposite page were reproduced were taken recently on an Auckland orchard, one of comparatively few where suitable illustrations could have been secured without previous warning to the grower. The grower does not run this orchard as a hobby or as a sideline to another business; it is a well-managed productive unit, consisting chiefly of citrus and stone-fruit trees, operated by the owner to provide a livelihood for himself and his family.

Packing Shed and Workshop

The upper view is of a well-equipped workbench in a corner of the 20ft. x 20ft. packing shed-workshop. Of the enviably-wide range of tools some, perhaps, are not strictly necessary for ordinary farm maintenance work, but they enable the owner to use his earlier experience as a mechanic to full advantage in the orchard.

Highlights of this picture are: The tidy arrangement of tools; adequate shelves and drawers, divided into various-sized compartments for storage of nails, bolts, miscellaneous materials, and gadgets in handy classified groups; a clean workbench, unlittered by the familiar collection of "junk," of which the possibly-useful items are stored in boxes or on shelves and the rubbish dumped into the barrel provided; and the clean floor, with its greatest possible area free of the casually-stored gear frequently left about to add to the difficulties of working in a confined space.

The shed is not large, nor has a fruit grader been installed yet. Lemons are graded at the Auckland district depot, and New Zealand grapefruit and stone fruits have been handled on a bin, of which one end is in the left foreground. The bench and shelves are of simple but solid and serviceable design.

Shelter for Field Implements

The middle photograph is of an open shed 24ft. x 16ft., with concrete floor and foundations and a corrugated asbestos sheet roof. The timber, which is creosoted, was cut out of the tops lopped from a too-tall *Pinus radiata* shelter belt on the property. This new shed, of comparatively-inexpensive design, is suitable for bulk storage in its closed end and for housing field implements. The front is permanently open, but the wide back entrance is fitted with sliding doors.

Though cultivating and other large field implements cannot be kept in the immaculate condition possible for small tools and indoor equipment, they are kept reasonably clean and, above all, in first-class mechanical order. Maintenance work is never neglected. Running repairs receive prompt attention so that minor faults, which develop from time to time in all implements, will not impair the efficiency of any machine.

Spraying Equipment

[*Sparrow Industrial Pictures Ltd. photo.*

The lower photograph shows the spray plant, housed in one half of a divided building 24ft. x 12ft., the other end of which is used for storage of bulky materials such as fertilisers. Here again is evidence of careful planning. The slightly-sloping floor and the bottom 6in. of the walls are of concrete, and the motor and pump are mounted on a raised concrete foundation. Cupboards, shelves, and a platform for heavy containers of spray materials are supported by concrete blocks which keep them clear of the floor. There are convenient places for tools and the inevitable odds and ends, as well as for supplies of all spray materials except those in large drums, which are kept outside.

The motor, pump, and vat are similar to those used on many other orchards, but it must be admitted that this photograph was taken shortly after they had received their annual overhaul and painting. The overhaul was not a very big task, because the whole outfit had been kept in exceptionally-good condition throughout the previous year. After each spray is finished, 15 to 20 minutes suffice to replace tools and materials, to give the motor and pump a quick wipe over, and to wash down the vat and floor—in other words, to tidy up. Running repairs and maintenance work are effected much more quickly and easily if machinery is kept reasonably clean.

Maintenance and Efficiency

The equipment of many other orchards is equal or superior to that illustrated, but only occasionally are a similarly-high level of efficiency and an equally-unhampered use of available floor space to be found.

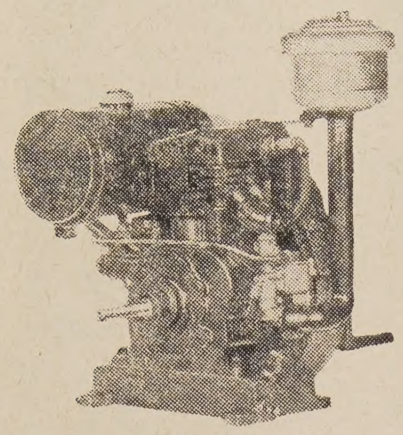
That much of the value of modern machinery is lost if it is permitted to fall into a state of disrepair is freely conceded; the importance of taking pains to prevent or minimise interference with continuous effective operation is less frequently appreciated. Prompt starts and uninterrupted runs can be expected only if everything is kept in orderly readiness for use, a condition to which cleaning up after each job makes a very large contribution. In these respects the requirements of farms differ little from those of factories, in which the need for methodical workmanship is unquestioned.

On less fortunately-situated farms where, perforce, inferior or older machines and tools must serve, the necessity for reducing preventable delays to a minimum is increased many fold. The possibilities of unforeseen trouble, inherent in well-worn implements, provide more than enough anxieties without any delays which, with a little forethought and effort, could be avoided.

A suggestion that several wet days could well be used for a general clean-up of workshop, sheds, and equipment is usually countered with an assertion that those days must always be devoted to other work, including accumulated odd jobs. Giving first place to improvements which would contribute substantially toward speedier and more efficient handling of many of those jobs is calculated to prove a much more profitable means to the same end.

On the majority of orchards which provide examples of the most effective use of available labour and equipment will be found evidence that the principle of "a place for everything and everything in its place" is closely followed. To that principle should be added a firm resolve to clean up after each job is completed.

BRIGGS & STRATTON



ENGINE SPARE PARTS

Brown Bros., New Zealand agents for world-famous Briggs & Stratton engines, are spare part stockists, carrying a complete range of spare parts for all types and models.

No Briggs & Stratton engine need stand idle. Every Briggs & Stratton engine sold is backed by a full range of spare parts available immediately.

Write to Brown Bros. for your requirements, stating model, type number and horsepower of the engine. Write also for prompt advice if your engine is not giving complete satisfaction.

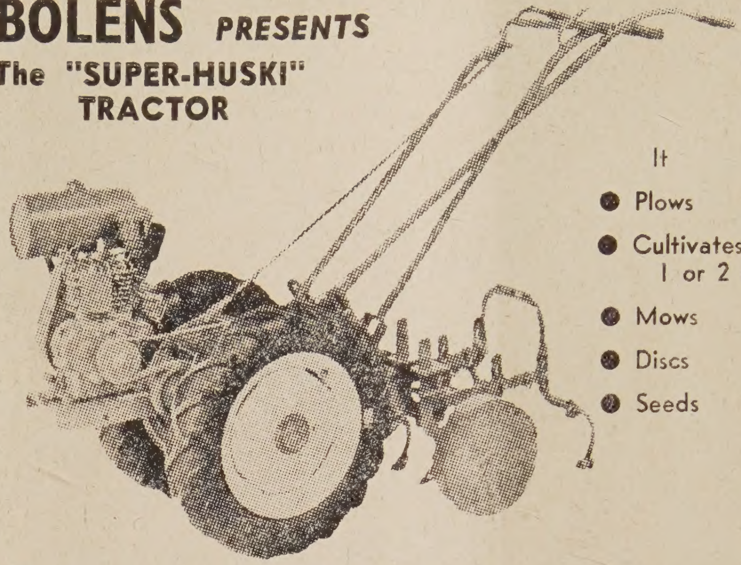
BROWN BROS.
(ENGINEERS) LTD.
590J Colombo St., Christchurch.
P.O. Box 548.

PREVENTION OF HYDATIDS

Measures which should eventually bring about the eradication of hydatids are contained in Bulletin No. 278, "Prevention of Hydatids," which is obtainable free from any office of the Department of Agriculture.

BOLENS *PRESENTS*

The "SUPER-HUSKI" TRACTOR



It
- Plows
- Cultivates 1 or 2 rows
- Mows
- Discs
- Seeds

Here it is! A NEW Model by the pioneers of the Garden Tractor Industry . . . NEW in Power . . . Performance . . . Economy and all round usefulness . . . and at a NEW low price WHICH YOU CAN AFFORD.

Write for details. Immediate delivery.

Box 1321. **IVORY BROS. LTD.** Wellington.

MARATHON GUMBOOTS

For work or play
MARATHON
"Marathon" tennis Shoes

Made by
Marathon Rubber
Footwear Ltd.,
Woolston,
Christchurch.

STOCK LOSSES FROM TRANSIT TETANY ARE COSTLY

By W. D. ROSS, *Veterinarian,*
Department of Agriculture, Palmerston North.

TRANSIT tetany, or train sickness, is a frequent cause of heavy losses of stock, and the trouble is particularly marked among in-calf beef breeds during seasonal shifting from run country to the flat, when a considerable amount of trucking by road and rail is involved, and up to 90 per cent. of a railed mob may die if not treated within a few hours of the appearance of symptoms.

IT is usual for beef cattle breeders during June, July, August, and September to sell their tail-end heifers and culled-for-age cows from beef country to buyers from the heavier river-flat areas, who after getting one or two calves from them and making good use of them in controlling their sheep pastures sell them as fats. This yearly migration of cattle involves a great deal of road or rail transport, often over long distances, as in the case of farmers in the Manawatu buying from Hawke's Bay or Wairarapa runs, and losses from transit tetany occur every year.

Predisposing Causes

To understand thoroughly the predisposing causes of transit tetany the handling of animals from the culling muster and drafting on the breeder's run through the saleyards to the truck and final destination must be studied.

In-calf cows and heifers to be offered for sale have to be mustered, yarded, and drafted, and to an animal accustomed to being left in peace for months on end, away from noise and excitement, the unusual sight of men and the worry of dogs and yards are very upsetting. The consequent excitement of the animal results in its using up an abnormal amount of calcium, the nerve-steadying mineral in the system. The amount used, of course, will vary according to how carefully or carelessly animals are handled, but no matter how easily they are taken, more calcium is used than would be in normal, peaceful grazing.

The initial loss of calcium is rarely made up, as the animals are yarded away from food and water or are too excited to eat. On top of this comes a road or rail journey to crowded, busy saleyards, where there is much more noise and excitement, with more often than not no feed or water for up to 24 hours, and where buyers and agents stir the cattle up every now and then to ensure their being viewed to the best advantage from the catwalks.

By this time the calcium in the animals' systems has reached a dangerously low level and there has been no time for rest, drink, and feed to bring about a natural restoration of the calcium balance.

A cow or heifer carrying a calf already has an extra drain on her calcium or bone-forming reserves to form the bones and tissues of the growing calf, and normally she has to deplete her own reserves and even draw on her own bones to get the required calcium to meet the ever-increasing demands of the unborn calf. This demand is very great in the last few months of pregnancy, but as a purely protective measure for herself and calf Nature provides that a heifer or cow in calf becomes less excitable. Thus the delicate balance between fit and unfit or normal and abnormal is maintained, and the calf is carried the full period of pregnancy without adverse effects on the mother or her milk supply.

Nature, however, did not allow for emotional, calcium-depleting upsets during mustering on the farm and the noise and excitement of saleyards, so that the demands on the calcium reserves of the in-calf cow and heifer then reach the abnormal stage.

If pregnant animals are quietly driven away from saleyards to their destination by road in easy stages on a good stock route, with plenty of food and water available, and are not overdriven or dogged, Nature will slowly restore the calcium in their systems to normal and the cattle will arrive at their destination, however far away it may be, in good order, and in fact in better order than when they left the run, as the exercise of walking builds up resistance, muscle, and bone. Driven, exercised heifers or cows are much fitter for calving than animals which have never been moved from pastures.

[*"The New Zealand Farmer" photo.*

Buyers or agents, however, who put pregnant heifers or cows straight into trucks from saleyards without a spell on good pasture are courting trouble. The strangeness and worry of mustering and saleyards have already caused a depletion of calcium reserves, and any further demand by the animals' systems threatens their health. If mustering and confinement in saleyards are strange, worrying experiences for cattle, railway yards, the banging of shunted trucks, train whistles, tunnels, and viaducts must be terrifying. During a rail journey they have the additional strain of having to stand all the way and of using their muscles continuously to keep their feet. In most cases they have no food or water from the time they enter the saleyards until they leave the truck, which may be 48 hours later.

This further heavy demand is placed on already-overdrawn calcium reserves of the heifer or cow far advanced in pregnancy, and a stage is very quickly reached when the functions of the body can no longer be carried out normally. In the later stages excitement which would drain a little calcium from a normal animal puts a load out of all proportion on the system of a deficient animal.

Symptoms

One of the symptoms of train sickness is partial paralysis of the legs, and toward the end of a rail journey several animals may be down in a truck and unable to rise. These are trampled by their unsteady fellow-travellers or suffocated by others lying on top of them; the trampled beasts, though alive on arrival, are usually so badly bruised that, despite treatment, they die from shock and absorption of the toxic products of the bruises.

When affected cattle are unloaded at their destination the symptoms of transit tetany are unmistakable; the

TRANSIT TETANY OF BEEF CATTLE

High-country beef cattle are accustomed to being left in peace for months on end, and when in-calf cows and heifers to be offered for sale are mustered, yarded, and drafted the unusual sight of men and worry of dogs and yards are very upsetting. The road or rail journey and the crowded saleyards are an extra strain likely to lead to transit tetany.

If stock are removed from saleyards quietly and taken, without dogging or overdriving them, to their destination by road in easy stages on a good stock route with plenty of food and water available, the ill effects on the animals' systems of the unusual excitement up to time of sale will be counteracted and they will arrive in at least as good order as when they left their high-country run.

[*Photographs: Top and bottom, "The New Zealand Farmer;" middle, National Publicity Studios.*

[*F. M. Niederer photo.*

Cattle resting in a holding paddock during a quiet journey to their destination. If they are not overdriven or dogged, cattle in the exercise of walking build up resistance, muscle, and bone.

animals are unduly suspicious of men and dogs and are restless and stagger when driven; they make short rushes at drovers or dogs and fall over and may stay down; some may have to be dragged out of the truck, as once they are down the partial paralysis of the legs makes it difficult for them to get up. The nostrils are dilated, the rate of breathing is increased, and the pulse is fast. When at rest the ears of affected cattle twitch and the head is moved jerkily from side to side. If allowed access to water in the early stages of infection, cattle show great thirst, and if they are allowed too much to drink they vomit it up again with pieces of undigested food, which there is great danger of their inhaling into the lungs, thus giving rise to pneumonia.

Without treatment affected animals take up the attitude of a cow with milk fever and die in a coma. Some may stay down for two or three days, gradually getting weaker; others may show improvement in a few hours. If the in-calf heifer or cow aborts in the early stages and no pneumonia sets in, recovery is usually fairly quick. In milder cases cattle may seem unaffected when unloaded, apart from being nervy and having an anxious expression, but care has to be taken, as the sickness has been known to develop up to 24 hours after unloading, particularly if they are driven a long way from the station or are hustled along busy roads.

Treatment

If unattended, up to 90 per cent. of an affected mob may die. If treatment is to be of any use, it must be started early. If hoses are available in railway yards and the weather is not too cold or windy, cattle should be hosed down along the back until they shiver. This calms them down, reduces fast breathing and elevated temperature, and in very mild cases may cure some, but to be safe all visibly-affected cattle should receive a calcium boro-gluconate injection.

The ordinary milk fever injection of 12 fluid ounces of calcium gives excellent results, and private veterinarians or chemists can make this up to suit the number of cattle affected. The following prescription has given very good results in transit tetany cases:—

CALCIUM BORO-GLUCONATE INJECTION FOR MILK FEVER

Calcium gluconate	2oz.
Boric acid	3 drachms
Phenol	30 minims
Water	Up to 12oz.

Boil the calcium, gluconate, and boracic in the water before adding the phenol.

This may seem a small dose of calcium, but experience has shown that it is enough to start the ductless glands producing again. The results achieved, as those who have had experience with milk fever cases in cows will know, seem far to exceed the means used.

The next difficulty is to get close enough to the cattle to give the injection. If there is a cattle race handy, so much the better. Cattle able to walk can be done in the race or crush. The full 12oz., warm if possible, should be given to each one, injected just under the skin anywhere on the body that can be reached; along the neck and behind the shoulder are best, but train-sick cattle may have to be injected wherever opportunity offers. After injection the area should be gently massaged to hasten absorption. Several injections may be necessary to use the dose up.

Cattle that are down and unable to rise can be treated with assistance where they lie, but there are always a few awkward ones that can get up and charge for a few yards and then go down again. These are the dangerous ones, and a few agile assistants are required to rope them. It is as well to let them charge and when they fall to grab them, and rope a hind leg. They usually charge in a straight line, so with care nobody should be hurt. More force or ropes than necessary should not be used, as a few cattle, if they are thrown and struggle against the ropes, become much worse and are apt to vomit food and water, and if a semi-conscious animal breathes bits of food into the lung, there is danger of pneumonia developing, which is liable to kill it even if the injection is a success.

All animals down and unable to rise should be propped up; their legs should be got underneath them and bales of hay, posts, or anything at hand used as props. If they are unassisted, they will lie on their sides like a milk fever case and bloat and die in a very short time. As soon as the coma passes they can maintain their own equilibrium.

Bad cases may require more injections 4 to 6 hours later. There should be no hesitation about giving more; the worst that can happen is an abscess where injections are made, but this is better than a dead animal. An effort should be made to move all affected stock fit to walk to a flat, even paddock without drains that they can fall into, and with good shelter, feed, and water. They will take a week or two to pick up properly and abortions can be expected. If molasses can be obtained in the solid, a few blocks should be left available to the cattle as required under shelter.

If cattle travelling by ship encounter bad weather, they can become badly affected with transit tetany. The symptoms can be mistaken for those

TRANSIT TETANY OF STOCK . . .

of sea sickness, but transit tetany is the actual cause of death. In one very bad case the ship struck bad weather and the battens which formed the pens in the holds gave way with the weight of the sliding, swaying cattle, so that cattle fell to one side on one roll and to the other on the next. Those that did not die of transit tetany died of bruising. When sending cattle by ship it is advisable to use only good, seasoned timber of double the thickness needed for temporary pens.

Dairy Cattle

Every year there are a few losses in in-calf dairy cows and heifers railed from sales to purchasers' farms; some of them, particularly pedigree stock, have to travel long distances.

A dairy cow can stand more trucking than an in-calf run cow, because she is accustomed to yarding and handling and is usually more robust as a result of having to build up a calf and be milked as well, but cases of transit tetany in dairy cows occur often enough to make it necessary to warn farmers to be on the lookout for symptoms of the trouble in recently-purchased dairy cows or heifers railed some distance. If cows or heifers are kept under observation for a few days in a small, sheltered paddock near the house, with a bit of extra feed, there is a better chance for signs of train sickness to be noticed early so that milk fever injections can be given immediately.

Most losses occur when an animal is taken straight off the truck and put in with the herd. If she is a potential case of transit tetany and the other cows worry her, as they will any stranger, it is enough to precipitate an attack, and the farmer rounding up in the morning will usually find her driven into a drain and stricken with what appears to be milk fever.

Treatment at this stage may pull her round if she is sledged up to a warm corner near the house, well propped up with hay bales, and nursed round after calcium injections. However, the resistance of a cow in this condition is very low and she catches pneumonia easily.

Abortion may occur in transit tetany cases, no matter what stage of pregnancy the animal has reached. Cases which abort early recover quickly, often of their own accord, but treatment is essential, because not only is there no guarantee that they will abort and recover, but treatment may prevent loss of the calf as well as save the life of the mother.

In-lamb Ewes

In-lamb ewes trucked late in pregnancy are often victims of transit tetany and require treatment with calcium injections, the dose being a quarter of that for cattle. The same milk fever or lambing sickness symptoms are observed, but a ewe gives less warning and dies more readily than a cow, so that if in a truck of pregnant ewes one or two are down or dead and some are uncertain on their legs, grind their teeth, and are nervy and jumpy, treatment should be given immediately. If the symptoms are ignored, losses may be very heavy and many of those which recover may abort.

Fat Bullocks

Fat bullocks in soft condition and unaccustomed to strenuous exercise which are trucked long distances from good pastures to freezing works are also liable to attacks of transit tetany, especially in hot weather or in hot, crowded trucks without food or water. If fat stock cannot be sent by road, a good preventive measure is to hard feed them on good hay for a few days before trucking. They should be watered before railing and left a bit of hay in the trucks to eat on the way. Losses due to bullocks going down in trucks are serious enough to warrant the use of a few bales of good hay. A fat bullock that has been down in the truck is almost certain to be condemned at the works for bruising. It is not uncommon for trucked fat cattle to suffer broken legs when other beasts fall on them, and despite every effort at the works to have them killed as quickly as possible, often at the unloading banks, rarely is enough saved from a bullock down in the truck, apart from the hide, to pay for the trucking. The temperature of a train-sick bullock is high and the carcass fevered in any case, but a badly-bruised carcass cannot be bled out and decomposes very rapidly. Fevered carcasses must be condemned because of the danger of food poisoning.

Pigs

During the hotter months of the year there are some heavy losses of bacon pigs trucked from a distance or over a holiday period, when they have to be held in trucks for a long time with no food, shade, or water. Trucks of pigs sometimes arrive in summer at bacon factories with up to 50 per cent. dead and the rest so bruised or fevered that they have to be condemned.

Pigs which have been given all the food and liquid they will hold with a minimum of exercise are in no condition to stand up to long, hot journeys during which they sway and slide around, often in unsuitable cattle trucks. Transit tetany often appears quite early in the journey; pigs go into a coma, heat control is lost, and lack of water and the hot weather soon result in their death from a combination of transit tetany, heat stroke, and dehydration.

If the sending of fat bacon pigs to a bacon factory or freezing works in hot weather cannot be avoided, endeavour should be made to arrange for their travelling to be done at night and to the nearest factory or works. Too frequently pigs have travelled nearly 300 miles in hot weather past several factories to arrive dead at their destination. It is immaterial who stands the immediate loss—the owner or the company—because as far as New Zealand is concerned it is all a loss to the country's production effort.

For practical purposes another week more or less on the farm would not hurt the baconer. Freezing companies and bacon factories have neither the space nor the facilities to treat the pigs for train sickness and hold them until fit to kill, so all that can be done to insure their being fit to export must be done at the dispatch end.

Horses

Cases of transit tetany sometimes occur in horses when a mare is taken straight from pasture and put in a loose box for foaling or sent by rail to a stud farm, and ponies of both sexes packed in cattle trucks and railed long distances to sales or shows are liable to be affected.

Symptoms in horses are excitement, whinnying, pawing with the fore feet, sweating, and twitching and jerking of the head. The limbs appear stiff and movements are stilted. The pulse is fast and breathing is accelerated.

Sixty per cent. of affected animals that have not been treated have been known to die. Treatment consists of giving calcium gluconate injections at once and turning the animals out to grass. The same calcium boro-gluconate is used as for other stock, but the quantity is adjusted according to the size of the animal.

◆

BOOK REVIEW

"Stock Poisoning:" T. K. Ryan

THIS book by T. K. Ryan, Inspector of Stock, New South Wales, is very readable and interesting from the point of view of the author's experiences, giving excellent practical hints on handling stock, shearing shed hygiene as a means of preventing disease, and the investigating of suspected poisoning outbreaks.

Most of the illustrations are good and interesting, but a few are of little value, and the treatment of diseases in some cases does not coincide with the procedure now generally accepted as best by the veterinary profession.

The book deals with vaccination for the prevention of mastitis and strangles, which is not recommended in New Zealand, and the treatment by lengthy washing out or of culling reactors to the agglutination test for *Brucella abortis*, which is not practised where calfhood vaccination is in general use. Calfhood vaccination is not mentioned by the author. The dosages of drugs need checking over, those for arecoline hydrobromide on page 189 being dangerously vague. Some of the prescriptions are inaccurate and others have been superseded by more efficient treatments.

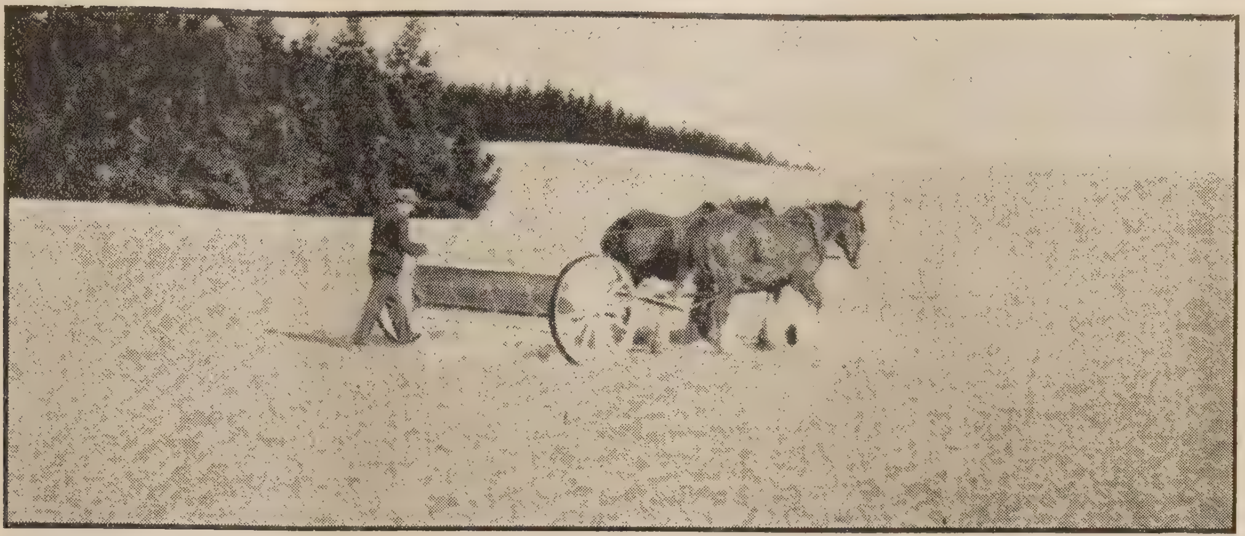
Though general conditions of farming in New South Wales are often very different from those in New Zealand, and a large proportion of the poisonous plants listed do not grow in New Zealand, the book has considerable value to stockmen.

—H. D. Le S.

Published by Associated General Publications Pty. Ltd., Sydney. N.Z. Agents: Democracy Publishing Co., Wellington. 18s. 6d.

◆

Improving Pastures in Otago and Southland



PASTURE improvement in Otago and Southland is more associated with the plough than with surface sowing as in the North Island, because the provision of adequate winter feed, together with the production of cash crops, necessitates the resowing of a large area annually. In consequence, renewal of worn-out pastures becomes a recognised feature of farm economy. Some 65,000 acres in Otago and 68,000 acres in Southland are sown to pasture each year.

By A. STUART, *Assistant Fields Superintendent, Dunedin.*

> Topdressing with both lime and phosphate is essential for the establishment and maintenance of high-producing pastures on most soils of Otago and Southland.

ANOTHER feature of farm management is the sowing of pastures with nurse crops. Some 42,000 acres in Otago and 55,000 acres in Southland are sown in this manner, representing 64 and 80 per cent. of the total areas sown in grass annually in the two land districts. Most crops are spring sown, which necessitates spring sowing of pasture mixtures.

Condition of Seed-bed

The soil conditions necessary at sowing time are essentially the same as for other districts in New Zealand. The land should be firm, reasonably fine, well drained, and in good heart. The consolidation necessary is obtained by rolling, and for grass mixtures this operation cannot be overdone. Fineness is necessary, particularly for the smaller seeds such as white clover, timothy, and crested dogstail, or seeds become buried too deeply and germination is poorer.

On much of the plains area. and particularly in the coastal districts, where rainfall is much higher than inland, drainage is necessary. Mole drainage, usually in conjunction with tile drains already present, as a general rule is sufficient to rectify drainage deficiencies. These operations are usually attended to before the land is broken out of old pasture.

The land is usually in good heart when sown after a short cropping rotation in which at least one of the crops taken is swedes, turnips, rape, or kale which is fed off in the field. A common practice in the higher-rainfall areas is to apply 1 ton of carbonate of lime an acre some two months before the first crop (usually swedes) is ridged; that greatly assists the tilth of the seed-bed.

Fertilisers and Lime

Most soils of Otago and Southland, with the exception of those of Central Otago, are deficient in lime and phosphate, and a few areas respond to potash—for example, portions of the Mataura River valley.

In the higher-rainfall areas, which in the main are those most deficient in lime, it is usual to apply at least 1 ton of carbonate of lime an acre immedately before sowing grass in addition to the ton before sowing the first crop. If available, 2 to 3cwt. of phosphate should also be sown at the time of seeding, with 1cwt. an acre of 30 per cent. potash salts if deemed necessary.

If lime is not available immediately before the grass seed is sown, it should be applied as early as possible in the first autumn of the life of the pasture. That also applies when the grass has been sown out with a spring-sown nurse crop of cereals or lamb feed.

Time of Sowing

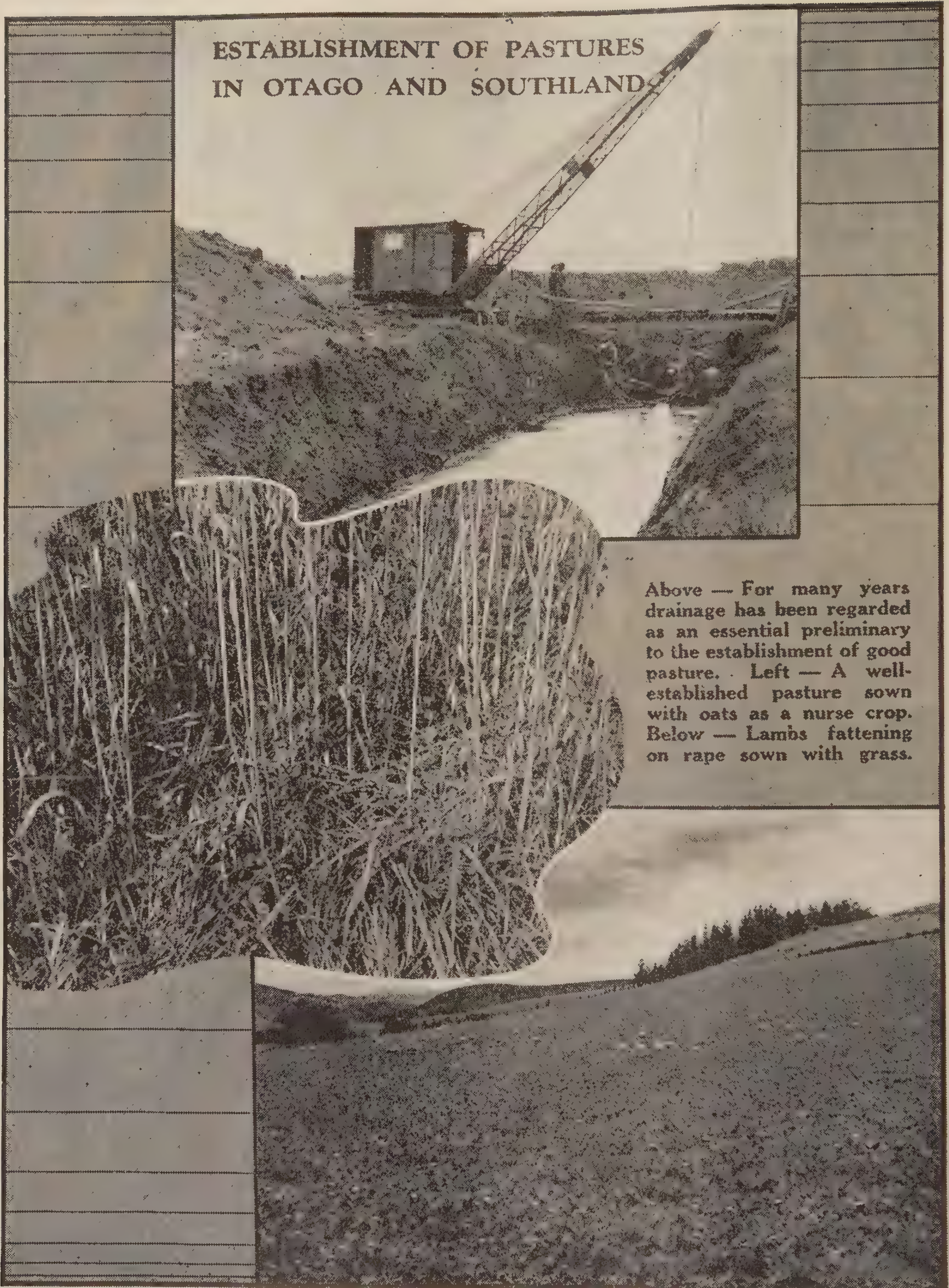
Spring sowing of grass is generally favoured in Otago and Southland, the more so because a high proportion is sown out with a nurse crop. The basis for the popularity of this method of sowing is largely economic, but it is more successful in Otago and Southland than elsewhere in New Zealand. The reasons are not obvious, but

CULTIVATED LAND OF OTAGO AND SOUTHLAND

LAND DISTRICT	GRASSES, CLOVERS, AND LUCERNE (acres)				TOTAL AREA CULTIVATED (acres)	UNIMPROVED LAND (acres)	TOTAL AREA OCCUPIED (acres)
	Sown since January 31, 1945		Sown before Jan. 31, 1945	Total			
	On virgin land	On land in pasture or under cultivation previously					
Otago ..	2,392	63,072	1,254,865	1,320,329	1,527,337	6,603,381	8,130,718
Southland	3,391	65,431	1,187,437	1,256,259	1,406,215	1,909,732	3,315,947

[From the Statistical Report on Agricultural and Pastoral Production 1945-46.]

ESTABLISHMENT OF PASTURES IN OTAGO AND SOUTHLAND



Above — For many years drainage has been regarded as an essential preliminary to the establishment of good pasture. Left — A well-established pasture sown with oats as a nurse crop. Below — Lambs fattening on rape sown with grass.

The growing of nurse crops in pastures is a special feature of farm management in Otago and Southland. Nearest the camera in the illustration above is grass which was sown with rape. The grass behind it was sown with oats, which are in stook.

several factors may be involved, including the higher seeding rate of grass mixtures, the high and relatively-even distribution of the summer rainfall, the fact that clovers have a longer period to establish before being grazed by stock, and in some cases the suppression of weeds by the nurse crop.

The most common nurse crops are oats—in some cases wheat—rape, and turnips, either alone or in combination. Wheat crops are sown in August or September and oats mainly in October, but sowings of rape and turnips may be spread over a longer period, possibly October to December.

Occasionally, because of adverse weather after the cereal crop is sown, the sowing of the grass-seed mixture is delayed until after the cereal crop is established. In such cases it is necessary to wait until the crop is firmly established to enable it to withstand the harrowing and rolling necessary for grass seed establishment, which usually would be after the crop is 2 to 3in. high.

Pure grass-seed mixtures may be sown during summer, but if grass is sown later than February, winter-feed crops such as oats, ryecorn, or black barley are usually sown as nurse crops to minimise the danger of frost lift and to provide a greater bulk of feed for stock.

In general, late-autumn sowings are not advisable, as the establishment of clovers in particular is interfered with.

Pasture Mixture and Seeding

Seedings in Otago and Southland are invariably heavier than in most other districts of New Zealand. That applies in particular to the higher-rainfall areas, but heavy seedings are a worthwhile insurance against adverse conditions during germination and are accepted as such by farmers throughout these areas.

For the coastal ploughable areas, capable of carrying 3 to 5 ewes an acre, the following mixture is recommended:—

	lb. per acre
Certified perennial ryegrass ..	25
Certified short-rotation ryegrass	10
Certified white clover	3
Certified Montgomery red clover	2
Certified timothy	5
Total	45

If the mixture is sown with oats, the short-rotation ryegrass should be reduced or eliminated, as its excessive growth would interfere with harvesting. If the mixture is sown with wheat, the short-rotation ryegrass can be retained, as most wheat crops are now header harvested.

The dairy farmer would include up to 10lb. of Certified cocksfoot, reducing the amount of perennial ryegrass by that amount. Where cocksfoot is sown it is usual to include 2 to 3lb. of crested dogstail.

On rich alluvial soils, such as those at Inchclutha in South Otago and Mataura Island in Southland, meadow foxtail could be included to advantage. Where conditions suit it this grass has become dominant in the sward when a seeding of ½ to 1lb. an acre has been included, though the transition then takes longer than if heavier seedings were used initially. Spring growth from this grass is early and prolific.

Management of Young Sward

If the seeds mixture has been sown under the right conditions and supplied with adequate fertiliser and lime, a satisfactory sward should result. If sown with a nurse crop of cereals, the sward will not be grazed until the crop is harvested, which may be in February or even March. If the grass is sown with lamb feed, grazing will be delayed until the feed crop is at the ideal stage for feeding.

On a sheep farm the young sward undoubtedly will be reserved for the weaned lambs, and if rape or turnips is the nurse crop, the paddock will be grazed in breaks. After a recovery period the paddock may be grazed lightly by the ewe flock before tupping time, and then closed to stock during the winter and reserved for use by ewes immediately before or after lambing in spring.

Only by lenient grazing in the early life of the pasture is clover development fostered. Without it the sward tends to become unthrifty and the ryegrass will disappear, leaving the way open to the invasion of browntop and other inferior grasses, annual clovers, and weeds.

Treated as recommended and with annual topdressing, the sward becomes truly permanent and productive. Topdressing should consist of an annual application of 1½ to 2cwt. of superphosphate and carbonate of lime at the rate of 5cwt. an acre a year or 10cwt. every second year, preferably in early autumn.

Improvement of Poor Swards

Though about 80 per cent. of the occupied area in Otago and 57 per cent. in Southland is classified as unimproved land, it is not from these vast areas that pasture improvement can be expected. They represent mainly the pastoral runs consisting of rugged, mountainous country and embrace the depleted and arid regions of Central Otago. On these areas carrying capacity is estimated not in sheep to the acre but in acres to the sheep. The introduction of grazing animals—sheep and, unfortunately, also rabbits—has resulted in deterioration of the original tussock vegetation, which has caused erosion and a reduction in carrying capacity. All the improvement that can be reasonably expected is the introduction by trial and error of species which are suitable for dry conditions and can withstand severe grazing. This method

Much of the rolling clay country of Otago and Southland has been converted from browntop or manuka to good fattening pasture land.

calls for a long-term research programme, and a start has already been made. Progress must be slow.

It is in districts where browntop is now dominant that the greatest improvement can be expected from liming and topdressing without ploughing. In the main, these districts are in South Otago and Southland, and a good deal of the area is ploughable.

Provided some clover is present, by topdressing with lime and, in later years, phosphate the sward is improved. The browntop becomes more palatable, the clovers increase—notably suckling clover and later still white clover—and eventually a dominant browntop-white clover sward develops. This type of sward can persist indefinitely, is easily managed, and is capable of fat lamb production.

METEOROLOGICAL RECORDS FOR MAY

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Waipapakauri	6	57.8	+ 0.4	71.2	38.8	5.73	20	+ 0.64	0.75	17	
Auckland	160	57.5	+ 0.9	71.0	47.0	7.52	24	+ 2.54	1.15	17	118.4
Tauranga	10	54.2	+ 0.9	70.0	35.1	7.37	21	+ 2.53	1.82	21	139.5
Ruakura	131	52.6	+ 0.9	66.5	34.7	7.21	21	+ 2.63	1.02	17	107.1
Rotorua	980	51.0	+ 1.3	67.0	34.0	11.27	20	+ 5.81	1.78	21	93.1
Gisborne	13	54.4	+ 1.6	70.0	32.0	13.51	18	+ 9.02	4.44	13	145.7
New Plymouth ..	160	54.3	+ 0.9	64.4	42.4	16.01	21	+ 10.12	2.21	18	119.8
Taihape	2157	47.4	+ 0.9	64.2	33.4	8.09	22	+ 4.76	1.26	22	
Napier	5	54.4	+ 2.0	68.9	33.1	6.41	15	+ 3.20	1.71	12	150.6
Wanganui	72	53.4	+ 1.5	65.7	37.8	9.56	23	+ 6.33	1.69	22	124.9
Palmerston North ..	110	51.8	+ 1.3	64.0	36.6	8.74	22	+ 5.34	2.91	22	102.9
Waingawa	350	50.9	+ 1.9	67.0	30.4	8.37	18	+ 4.37	3.06	22	129.2
Wellington	415	52.1	+ 0.9	63.0	40.0	7.92	21	+ 3.58	2.07	22	112.0
Nelson	24	51.4	+ 0.9	64.4	35.2	7.51	16	+ 4.36	1.30	19	123.7
Waterlea	12	50.8	+ 0.8	67.8	30.3	7.19	17	+ 4.89	3.73	22	161.0
Hokitika	12	49.6	+ 1.4	62.2	29.4	14.26	20	+ 4.81	2.92	30	95.6
Hanmer Springs ..	1225	46.0	+ 1.5	69.0	24.3	5.56	15	+ 0.96	1.95	22	125.6
Christchurch ..	22	48.9	+ 1.4	66.2	29.3	2.99	9	+ 0.11	1.58	22	128.7
Ashburton	323	48.0	+ 2.1	68.8	27.0	2.20	13	— 0.29	1.13	22	123.7
Timaru	56	47.2	+ 0.5	66.6	29.8	1.33	7	— 0.18	0.30	22	127.6
Alexandra	520	42.2	— 0.7	65.7	21.8	1.12	10	+ 0.19	0.37	30	122.9
Taieri	80	45.5	— 0.4	70.0	23.8	1.42	13	— 0.88	0.36	18	
Invercargill ..	32	46.4	+ 0.7	61.0	26.0	2.68	20	— 1.52	0.66	31	87.6

Surface Sowing of Pastures

On a recently-acquired farm more paddocks may require ploughing and renewal of pasture than it is economically possible to handle. The best of them could be improved by the introduction of better species by surface sowing in conjunction with topdressing. Autumn is the natural time for seeding, and surface sowing probably gives best results then. The area should be grazed bare, then severely harrowed to obtain a desirable seedbed; the seed is sown with phosphate and lime if necessary, and the area chain-harrowed and rolled.

The carrying capacity and fattening qualities of old pastures can be considerably improved in this way, and this method is often used after a severe attack of grass-grub or porina caterpillar, though in such cases, as the results are most apparent in the spring, surface sowings would normally be made then. Good results are also achieved by feeding out good-quality hay on the affected areas if they are detected early enough in late autumn and winter. Some reseeding is obtained directly from the hay and indirectly through the animal, in the case of white clover in particular. The consolidation attained by the trampling of stock is also of assistance in the re-establishment of the pasture.

Though good results can be achieved by the surface sowing of grass, most farmers recognise that the best establishment follows the use of the plough. They also realise that pastures sown now with the Certified strains of grasses and clovers are far superior to those sown 20 years ago, even though they appear identical in botanical composition.

◆

POULTRY FARM FOOD STORES NEED CAREFUL PLANNING

FOOD stores on New Zealand poultry farms range from carefully-designed and well-laid-out buildings reflecting much planning on the owner's part to any shed which happened to be vacant when the first load of food was delivered to the farm. There is obviously room for much better planning and designing of poultry food stores, and this article by S. G. Haddon, Poultry Instructor, Palmerston North, deals with some of the principles underlying efficient design and discusses the equipment necessary in a food store.

[*Photo News Ltd. photo.*

Interior of a food store, showing the dry-mash mixer (in corner), grist mill, and greenfeed cutter.

THOUGH there are variations in the size and interior layout of food stores on different poultry farms, in all efficient stores careful planning is evident.

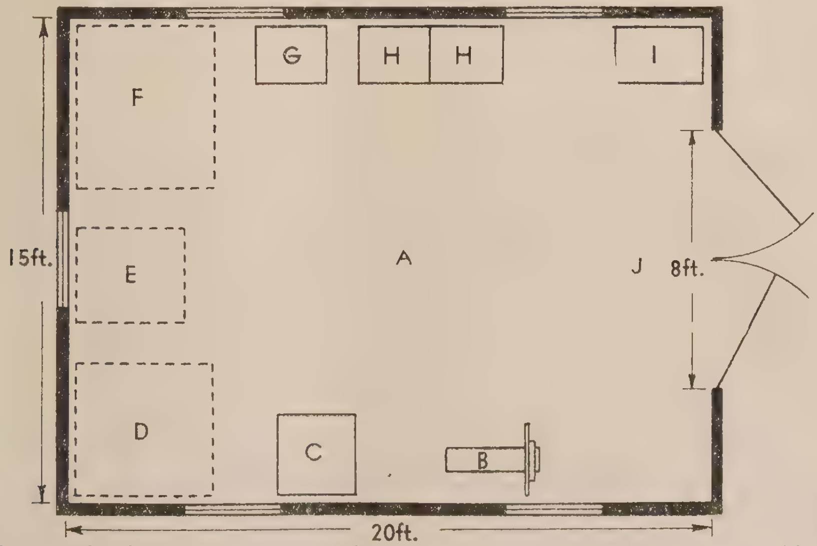
The two main functions of a food store are as follows:—

1. Storage of food and supplies for a long period, and
2. Preparation and storage of food for current use.

Storage of Food

The size of the food store will be governed by two factors: The size of the flock concerned and the size of the reserve of food which it is desired to house. Both these factors can be reduced to figures which may be useful as guides to building, and the following table gives the weight in pounds of 1 cubic foot of various ingredients:—

Ingredient	Approximate weight of 1 cubic foot lb.
Bran	15
Pollard	15
Wheat	47
Maize	44
Oats	31
Barley	35
Peas	47
Meat meal	38
Standard mash	25



Layout of a food store for a 1000-bird farm. A—Space for hand mixing with shovel. B—Chaff cutter. C—Grain mill. D—Storage space (7ft. x 4ft. x 4ft.) for one month's supply of grain. E—Storage space (3ft. x 3ft. 3ft.) for ½ ton of meat meal. F—Storage space (7ft. x 5ft. x 5ft.) for one month's supply of mash. G—Platform scale. H—Wet-mash mixing tubs. I—Desk. J—Doorway.

With the information given in the preceding table it is simple to calculate the amount of room needed to store any given quantity of food. Due allowance must be made, however, for food stored in sacks; for example, 1 ton of mash will take up less room in bins than in sacks.

One short ton of standard mash requires about 80 cubic feet of storage space. This space is calculated by dividing the weight of standard mash (2000lb.) by 25. Similarly, half a short ton of meat meal requires about 27 cubic feet of space (1000 ÷ 38), the rule being to divide the weight of food in pounds by the figure given for that particular food in the table above. It is thus comparatively easy to find how much room is required to store any of the more common foodstuffs and ingredients. However, it must be pointed out that the bushel is a volumetric measure, not a weight measure. It contains 2218 cubic inches, and as a cubic foot contains 1728 cubic inches, there are just over 1¼ cubic feet to 1 bushel or 8 gallons.

The problem may be approached from another angle, though the data given above are still used. The alternative method consists of finding out how much food is required for, say, 100 birds for one week and converting that figure to a cubic foot basis. It is then simple to convert the figure for 100 birds for one week to the figure for any sized flock and for any length of time required.

A laying pullet in its first year of production will consume about 45lb. of mash and 45lb. of grain. Converted to the quantities necessary for 100 birds for one week, the figures then are almost 90lb. of mash and 90lb. of grain. If these weights are converted to volumes, it will be found that a space of 3½ cubic feet is required for storing one week's supply of mash for 100 birds and 2¼ cubic feet of space for the grain, providing that a mixed grain consists of equal quantities of wheat, oats, and barley. Six cubic

POULTRY FARM FOOD STORES

[*Photo News Ltd. photo.*

A two-storey food store built on level ground. Note the hoist over the door in the upper storey.

feet of storage space should therefore be allowed for one week's food for every 100 adult birds. The storage space required for feed for younger birds (brooder chicks and youngsters just on range) would, of course, be less, but a close indication of their requirements can be gauged from the fact that about ½ ton each of mash and grain are required to rear 100 pullets from the day-old stage to the laying stage.

Preparation of Food

The range of working equipment of a food store will be governed by the type of feeding practised on the farm. There are four main types of feeding—dry-mash, wet-mash, wet-and-dry mash, and soaked-grain feeding. In addition, the preparation and mixing of the grain ration has to be considered.

The requirements for dry-mash feeding beyond provision of storage space are simple and may be limited to a concrete floor on which to turn mash with a shovel, a grain mill for preparation of wheat meal, etc., and a chaff or greenfeed cutter. On a large farm a mash mixer may be installed, a typical model being the one with a vertical worm and a capacity of up to 30cwt.

Some attention must be paid to the siting of these appliances. The one most in use should be placed where it can be worked most conveniently. For example, though it is not necessary for the operator to be able to walk all round a chaff cutter, he must be able to feed the material into it easily, to reach the unchaffed green stuff easily, and to collect the chaffed material readily. All these requirements can be met by placing the greenfeed cutter parallel with a wall and near the main door of the feed room.

A grain mill is often used as much as a chaff cutter and therefore should have good accessibility. An important consideration when siting a grain mill is its nearness to the main bulk of stored grain. If the store is a double-storey building, with the bulk of the storage space on the upper floor, the grain may be stored above the grain mill and fed down a chute to the hopper.

A dry-mash mixer is a bulky piece of equipment which requires a large shed for correct installation and efficient working. It is suited to the two-storey food store, the ingredients being handled on the top floor, tipped into the mixer, and withdrawn on the ground floor after mixing. The place chosen for a mash mixer of this type cannot be stated arbitrarily, but each case must be decided on its merits. A corner of the food store where ample strutting is available is probably as good a place as any.

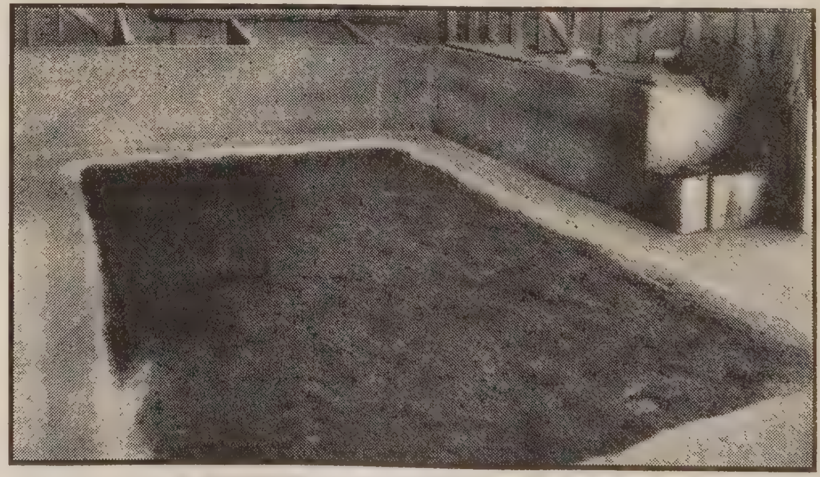
Where wet mash is fed either solely or in addition to dry mash mixing troughs and a water tap must be provided. A baker's wooden dough trough makes a most useful piece of equipment for the mixing and is best placed where good lighting is available. Correctly-mixed wet mash can often be judged by its appearance, though a truer result is obtained from the texture of the mix.

For soaked-grain feeding, now rarely practised in these days of standard mashes, storage space for at least 2 days' feed of prepared grain is required. To store his soaked-grain feed one farmer uses a set of nine concrete wash tubs, three tubs holding a day's supply of soaked grain. Another farmer uses 44-gallon drums cut in half lengthwise and mounted on racks; spigots for draining the water off are fitted in the screw-bung holes. The storage required for prepared soaked grain may be found easily by reference to the table.

Importance of Platform Scale

A piece of equipment rarely seen in a food store but one which should be regarded as important is a good platform scale capable of handling at least 200lb. at a time. Foods and ingredients should be weighed accurately and not measured by guesswork. It is a wise plan to standardise as far as possible the size, and therefore the weights, of all buckets used in the food store. It is then simple to obtain the true weight of the contents of any of the buckets. Weighed quantities of foodstuffs may also be converted into measures, using a "standardised" bucket as a unit of measure.

In the building of a food store such points as the need for one or two floors and the installation of lorry ramps must be left to the choice of the farmer. Some sites lend themselves to double-storey buildings, particularly if road access is available to the top storey; a hillside would offer such a site. Lorry ramps from ground level to upper floors are very useful, but are very expensive to build and maintain. A much better proposition is a reliable electric hoist and sack grab working from a short, projecting beam outside the store or through a hole in the top floor. If the hoist works from a hole in the top floor, room must be allowed for a lorry to back into the store so that the grab can be lowered on to the lorry tray.



[*Green and Hahn Ltd. photo.*

A food store fitted with storage bins and where wet mash is mixed by hand. Note how the greenfeed is incorporated in the wet mash.

CLOVERS—the Key to High Pasture Production

By **P. R. BARRER,** ***Instructor in Agriculture, Christchurch.***

AN unusual feature of New Zealand's indigenous plant covering is that the family of *Leguminosae,* which next to *Compositae* is the largest family of flowering plants, was originally very poorly represented, all the clovers now present having been introduced since the arrival of the white man. These exotic plants have found conditions very much to their liking and have co-existed with the grasses for very many years in providing the country's first-, second-, and third-class pastures. On many of the old bush-burn areas at least one or two clovers were sown. Though some of this land has deteriorated considerably, and the cover has degenerated to inferior grasses, weeds, and second growth, the application of fertiliser will often show up these dormant clovers, the stunted plants or seeds of which are awaiting suitable conditions of increased fertility.

ENGLISH farming history provides evidence for supposing that the value of red and white clovers was appreciated as early as the seventeenth century. In 1613 Sir Richard Weston was experimenting with red clover, and in 1663 Andrew Yarranton published a second edition of a book entitled "The Great Improvement of Lands by Clover."

The reasons for the particular value of clovers as pasture plants may be classed under two main headings: The food value of the clovers themselves, and their value in improving soil fertility so that better grasses are encouraged in the sward.

Food Value of Clovers

The better clovers—red, white, and subterranean—are generally recognised as providing valuable food in any pasture, while the lower-producing clovers, such as suckling clover, supply useful feed in pastures where they occur. In comparison with grasses, most clovers have a lower fibre content and a higher protein content; they have a higher ash or mineral content, mainly because of the considerably-larger amount of lime they contain; and frequently they are more palatable and highly relished by stock. In common with fresh grass, they have a plentiful supply of vitamins A, B, and C.

The nutritive value of clovers varies with the stage of growth at which they are fed off. If fed too early, they will be too watery and have a tendency to scour stock as well as to cause bloat; if fed too late, they may have too high a fibre content. Management correspondingly affects the food value of the grasses which form the sward with the clovers. The successful farmer aims to maintain a balance between these two components with the object, when seasonal conditions and stock requirements allow, of maintaining his sward in the proportion of two parts of grass to one of clover.

Soil Improvers

Clovers operate as the "nitrogen factory" of the farm through the symbiotic bacteria which live in nodules on clover roots and make available the nitrogen of the air. This association with bacteria is a particular virtue of legumes in general—for example, peas and lupins. Because of the liberation of "nodule nitrogen" by clovers in pastures, the grasses in association with them are able to grow more vigorously. That allows such a sward to carry more stock, which in turn void more manure and nitrogen, thus further increasing the pasture's productivity.

Clovers respond most markedly to phosphatic topdressing and to liming. Thus, in topdressing experiments a browntop or danthonia sward may show little or no response to lime or superphosphate but a clover pasture on the same soil may show a marked response.

Some of the most spectacular improvements in New Zealand pastures without ploughing have occurred through the use of subterranean clover, with the help of topdressing, in raising pastures from a browntop-danthonia-sweet vernal-suckling clover type of association to a dominant subterranean clover pasture; with continued topdressing this has eventually given rise to an association consisting mainly of perennial ryegrass, white clover, and subterranean clover. Such an improvement could not be effected merely by the introduction of clovers through surface sowing but only by the use of clovers in partnership with liming and topdressing. The lime and fertiliser increase soil fertility to the stage where the clovers, first subterranean and then white clover, are able to develop; in their turn the clovers help to increase soil fertility to the stage where ryegrass is able to become the dominant grass in the sward. Where ploughing is possible a swifter transformation from a matted browntop pasture to a ryegrass-white clover sward has been brought about by suitable cultivation, the use of lime and fertiliser, and the introduction of good strains of clover and ryegrass seed in the mixture sown.

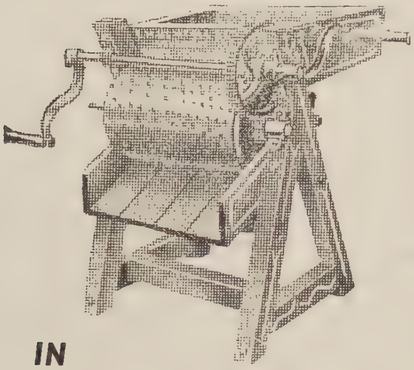
Clovers, then, are the key to high pasture production. Pastures without clover tend to be harsh and unthrifty, partly because of nitrogen starvation. It has been demonstrated by quantitative experiment that the nitrogen content of the soil is appreciably increased by the growing of clovers or other legumes.

Clover Establishment

Many clovers are available for use in New Zealand pastures, but to attempt the introduction of particular

Vigorous white clover of the Certified strain is the basis of high-producing pastures.

MAIZE SHELLERS
HERE AGAIN!



IN

LIMITED SUPPLY

BETNALL Virginia Maize Shellers, as above, with 21in. x 12in. toothed barrel, strip the cobs without injury—large or small amounts. Can be fitted with pulley for power.

Details on application to

JOHN BURNS & CO. LTD.

Head Office: Engineering Dept., Customs Street, Auckland.

Branches at Whangarei, Wellington, Christchurch, Greymouth, Gisborne, New Plymouth, Nelson and Timaru.

The More You See of Tractors . . .

The More You Will See in a CASE

Every year, more tractor owners of long experience turn to Case tractors for the things that count most. In the records of Case tractors they find dependable performance, good fuel economy, extra endurance. See your distributor now for full information. Four power groups and many models.

Distributors:

Sole N.Z. Agents:

JOHN CHAMBERS & SON LTD.

Auckland, Wellington,
Christchurch, Dunedin,
Invercargill, Timaru,
Hamilton, Palmerston North

CASE

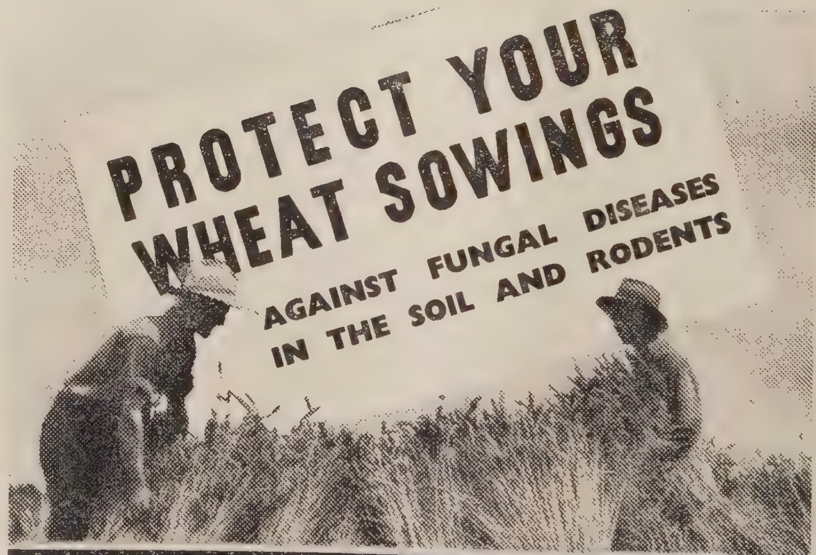
EVERY WAGON WANTED

For Railways' Constant Service

The quantity of meat, produce and other essentials which we send to our kinsfolk overseas is very largely dependent upon the constant and unhindered movement of railway rolling-stock. Every wagon standing idle means inconvenience or delay somewhere. Consignments lying unclaimed in goods sheds are another serious hindrance to transport.

Upon every user of the rail rests the responsibility of hastening the release of wagons and promptly removing consignments from goods sheds.

Collect Consignments Quickly



PROTECT YOUR WHEAT SOWINGS

AGAINST FUNGAL DISEASES IN THE SOIL AND RODENTS

Dust with

"AGROSAN" G.N. (REG.)

DRY SEED DRESSING

Obtainable from Stock and Station Agents, Seed Merchants, and Mobile Seed Units.
Distributors: IMPERIAL CHEMICAL INDUSTRIES (N.Z.) LTD., Wellington & Auckland.

clovers to soils or climates where they are not suited is wasteful and disappointing. Whatever the clovers, some general rules must be observed for their successful establishment.

First, the clovers require to be sown on a suitably-prepared seed-bed or, if surface sown, under the most favourable conditions possible.

Second, lime, phosphate, or both are required for best results.

Third, the strain of clover should be the best available, which implies the sowing of Certified strains if obtainable.

Fourth, the clovers should be sown at the right time for the district and not too late for proper establishment before the frost period.

Fifth, they should be sown in the right proportion in suitable seed mixtures.

Finally, the resulting pastures should be managed so as to allow the clovers every chance for proper establishment during early stages of growth.

With the exception of suckling clover, the southern tussock grasslands are deficient in clovers.

What Clovers to Use

To lay down hard-and-fast rules for the use of particular clovers under given conditions is not possible, but it is useful to set out some of the features of the main clovers.

White clover is the most useful clover in New Zealand pastures. It reaches its maximum usefulness under conditions of high fertility, but by liming and topdressing it may be encouraged to flourish on soils which originally were less fertile. It requires adequate lime and phosphate, but even on low- to medium-fertility soils which are not topdressed white clover is commonly present, though not flourishing. It is not suited to extremely wet or dry conditions or to very low-fertility areas. It is a perennial plant which, once established, will stand up to a reasonable amount of hard grazing by sheep or cattle.

Cowgrass or broad red clover is a short-rotation type particularly suited for hay areas and for grazing by cattle. It is commonly used with Italian ryegrass or short-rotation ryegrass for one- to three-year pastures which may be used for hay as well as feed. It gives a good bulk of feed in the spring and summer but is not a winter-feed producer. It does best under conditions of medium to high fertility and is not suited to extremes of wetness or dryness.

Montgomeryshire red clover is a more permanent type than cowgrass. It has a low crown which makes it more suitable for grazing by sheep. It has been found to do well on the clay downs of Canterbury, among other areas. It does not produce feed as early in the spring as does cowgrass, but fits in better with pastures for grazing because it does not tend to smother other pasture components to the same extent, except when it is allowed to go to seed.

Subterranean clover is an annual and therefore must be given every opportunity to reseed, particularly in its first year. It is a clover for low- to medium-fertility land under dry conditions. It requires phosphatic fertiliser for best results. It produces a good amount of feed in early spring but dies off in summer and autumn. After the autumn rains, when fresh plants come away, much feed is produced again in late autumn and winter. Therefore, stock and pasture management should aim at making use of these growth periods. In combination with topdressing, subterranean clover has been successful in breaking in much light land and in rejuvenating hill country.

Lotus major has been used successfully to assist in the breaking in of a different type of land—high-rainfall hill country and swampy land. It has been surface sown with great success on many such areas. It does quite well under conditions of average fertility. It produces a good bulk of feed in spring, summer, and autumn, but little in the winter-early spring period.

Strawberry clover is a perennial clover suited to damp and saline conditions, where it is particularly valuable, as other clovers, such as white clover, are unable to exist there. Where the land can be drained and white clover established, strawberry clover is superseded by white clover.

Suckling clover is an annual clover which is not recommended for inclusion in mixtures in any but low-fertility and dry areas. Where any of the preceding clovers can be established suckling clover could not be given a place, as it is only a poor feed producer at best.

Lucerne

A legume, lucerne is generally regarded as a specialised hay-producing crop on fertile, well-drained land, but recently it has also been used successfully to a limited extent in conjunction with cocksfoot as a grazing plant on light land for use for controlled grazing in the summer-autumn period.

◆

[*National Publicity Studios photo.*

In many parts of New Zealand the use of lime and phosphate is essential for the maintenance of a good cover of clover.

Calf Scours Losses a Drain on Production

By W. H. BISHOP, *Veterinary Research Officer, Ruakura Animal Research Station.*

EVERY year calf scours in its various forms causes the loss of a large number of young calves. Much of this loss could be avoided if dairy farmers would apply clean and hygienic measures in calf rearing and make early use of modern methods of treatment when the disease occurs. This article deals with some of the newest drugs available, members of the sulpha group, which have shown great promise in combating the organisms causing the trouble.

BY far the greatest causes of deaths of calves between birth and four weeks old are "white scours" and "blood scours," which has been clearly shown by figures in the twenty-third annual report of the New Zealand Dairy Board for the period ended July, 1947. From analysis of causes of death of 407 heifer calves born in 1946 it has been estimated that the deaths of 155 calves, or 38.1 per cent., were due to calf scours in its various forms. It is probable that this figure is on the conservative side when the whole dairy industry is considered, and any steps that can be taken to reduce losses will appreciably help the drive for higher production in New Zealand.

Calf scours usually occurs within the first four weeks of life and is characterised by listlessness and partial or complete loss of appetite; the hind parts are soiled with light-coloured, watery, and evil-smelling diarrhoea which is often tinged with reddish or brown blood. Loss of condition is rapid and unless treatment is applied in good time death may follow.

As all young animals, once they have contracted diseases, have little resistance against them, and scour is no exception, it is important to consider preventive measures in any discussion of treatment of the disease. Scour is undoubtedly associated with departure from the rules of good animal husbandry.

Calves should not be exposed to excessively-cold and damp conditions. Natural or man-made shelter should be provided against cold winds that sweep the country in spring.

Colostral milk is essential for at least the first three days of life in order to transfer to the new-born calf those antibodies or natural anti-bacterial substances needed to combat infection, as well as to ensure an adequate amount of vitamins as an added protection. There should be no tendency to deprive the calf of this colostral milk, as the law forbids the inclusion of a cow's milk for three days after calving in any supplies for human consumption.

[National Publicity Studios photo.

Scrupulously-clean feeding buckets and avoidance of over-feeding, particularly in the first few weeks of life, are major points in the prevention of calf scours. Bucket feeding allows a fairly accurate control to be kept over quantities fed.

All calf-feeding buckets should be kept scrupulously clean and care should be taken not to overfeed at any time, especially in the first few weeks of life. The great advantage of bucket feeding is that fairly accurate control can be kept over quantities fed.

Stress is also placed on the fact that the young animal's digestive system is vastly more prone to upset than that of the adult, and should not be subjected to violent and sudden changes of diet; this point is of particular importance at the time of change-over from whole milk to skim-milk or whey feed and at weaning time, when the new diet should be introduced gradually.

All milk should be at blood heat when fed to calves for the first month of life.

Calves must be given a good start, and though economy of labour must always be kept in mind, any extra time and trouble taken in rearing calves is well repaid.

At the onset of an attack of calf scours milk should be withheld for the first 24 hours to ensure that the digestive system is emptied of the mass of curd and fermenting material present, but as all calves acutely ill with scours suffer severely from "dehydration" or reduction of body fluids, it is essential that throughout the course of the illness liberal amounts of water be given to keep up the fluid level. It is often mistakenly assumed that cases of diarrhoea should be deprived of water. On the contrary, half a pint of warm water every three to four hours is sound treatment and will not aggravate the scouring. After the first day it is advisable to give affected calves milk and water in equal parts until there are distinct signs of improvement.

It is customary to give a laxative in the early stages of the illness, and castor oil is the most popular medicine administered to eliminate offending material from the bowel. Small doses are permissible, but if excessive amounts are given, as frequently happens, more harm than good results, because the already badly-inflamed sensitive bowel lining is irritated all the more by the action of the oil. Two tablespoonsful are considered sufficient for calves up to one month old, but if the services of a veterinarian are procurable, it is best to withhold even the administration of castor oil until his advice has been given.

The treatment of calf scours has been greatly improved in recent years by the use of sulpha drugs. It has been found that though some members of the group are exceedingly useful in the treatment of various internal diseases such as pneumonia, others, because they are not so readily absorbed from the bowel, are more successful in curing digestive upsets. Thus a fairly high concentration of the drug may be maintained and a more intense and lasting action can be exerted upon the offending bacteria. Toxic effects sometimes associated with sulpha drugs are largely eliminated. Two of the most useful drugs in the sulpha group are sulphaguanidine and phthalylsulphathiazole, both obtainable as white powders or in tablet form and easily administered. All sulpha drugs are classed as poisons under the Poison Act, 1934, and so are obtainable only directly from or on a prescription from a veterinary surgeon or veterinary practitioner who should be consulted as soon as the first case occurs.

The efficacy of treatment by these drugs depends on the speed with which they are administered—the earlier the better—and the expenditure of the maximum amount of time and trouble in nursing the sick calf.

On farms where calf scours occurs regularly and where a large number of calves become affected it would be wise to arrange for calves to live on entirely-fresh pasture for a season. Experience has shown that the disease can be eliminated or greatly reduced by attention to cleanliness and careful feeding and the avoidance of over-crowded conditions.

THE HOME GARDEN IN JULY

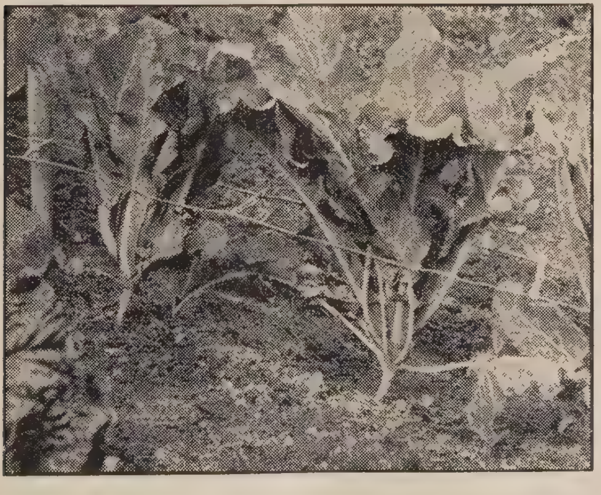
By A. G. KENNELLY,
Instructor in Vegetable Culture, Christchurch.

THOUGH July is usually considered the beginning of the garden year, most home gardeners will continue to be engaged throughout the month on work such as tidying, planning, and, where weather conditions permit, draining or digging. Except in a few favoured districts such as the northern parts of the North Island, climatic conditions are rarely suitable for the sowing of a considerable quantity of seed. Even where climatic and soil conditions are favourable, sowings should preferably be small and limited to comparatively-hardy subjects such as spinach, silver beet, broad beans, carrots, turnips, radish, beetroot, and onions.

IN the less-favoured districts lettuce and silver beet can be sown in frames, though if cloches are used, all the seed listed above can be sown in well-drained soil, provided the cloches are put in position 10 to 14 days before sowing to bring the soil into suitable condition for sowing.

Hardy subjects such as spring cabbage and shallots can be set out in manured and well-drained soil, and where climatic conditions are not too severe, lettuce and cauliflower may also be set out. Established rhubarb and asparagus beds should be cultivated and manured if this work has not yet been done, and if soil conditions permit, the ground can be prepared for new beds. Tubers of Jerusalem artichoke can be sorted over and small tubers planted in districts where soil conditions are suitable.

Potatoes in store can be sorted over and rotted ones eliminated, and the herb garden can be renewed or extended. During spells of wet weather tools can be sharpened and cleaned; bins, shelves, and benches made, improved, or renewed; soil can be sterilised, and seed boxes made or repaired. Woody or diseased rubbish can be burnt and most other soft garden trash composted. July is a good time to paint the garden wheelbarrow and other garden accessories such as the garden seat or chairs and the marking stick, or to paint cupboards or the inside of the glasshouse. The attractiveness of most home gardens can be greatly enhanced by the construction of such features as a pergola or some of the simple trellis designs on the next page. A garden seat can easily be made and a simple and well-designed seat is a welcome acquisition to almost any home garden. The seat shown on page 535 is solid and simple in construction.



[Photo News Ltd. photo.

In exposed gardens brussels sprouts should be securely supported to avoid damage from heavy winds. The plants may be staked individually or can be supported by a wire on each side of the row. The wires are bound together between each plant and are tied to stakes placed at intervals along the row.

[Sparrow Industrial Pictures Ltd. photo.

Silver beet is among the most suitable plants for early sowing. In specially-favoured areas and northern districts outside sowings may be made, but elsewhere sowings should be made in a box in a frame and the plants set out when the weather is warmer.

Planning Garden Work

Planning gardening work for the forthcoming year is important because it has a considerable bearing on production and garden efficiency, and to the keen gardener it is very interesting. There are several ways of planning production. Some gardeners rely on a notebook in which each section of the garden is numbered; others prefer to draw up a plan either roughly or accurately to scale, for efficiency can usually be greatly increased if a carefully-prepared plan is followed. The plan should be designed to ensure a supply of fresh vegetables all the year round and at the same time to make maximum use of available ground. It should give a simple rotation of crops; for instance, crops such as brassicas, celery, marrow, and pumpkin, which do well on soil richly dressed with only partly-rotted organic manures, can be rotated with tap-rooted crops such as carrots, parsnips, and beet, which are specially suited to ground that was richly manured with organic material the previous year.

The following points should be considered in planning production:—

1. Perennial crops such as asparagus and rhubarb should be planted where they will not interfere with winter digging or trenching.
2. Tall crops such as sweet corn and tomatoes should be planted where they will not overshadow other crops.
3. Where possible rows should be placed so that they run north and south to avoid shading.
4. If crops such as pumpkin and marrow are grown in rows, the runners should be pegged and stopped to prevent them overrunning smaller crops.
5. Weeding and cultivation are usually easier when vegetables are sown in rows rather than broadcast in beds, and where a number of small sowings are to be made

one long row of different subjects is preferable to several short rows, even though each is of only one kind of vegetable.

6. Cultivation is usually easier and danger of ground consolidation less where spacing is liberal; inter-row cropping is rarely as successful as where vegetables are well spaced.
7. In sloping gardens it is usually advisable to have the rows running across rather than up and down.
8. Herbs are best planted close together and in easily-accessible positions.
9. To avoid soil exhaustion and to keep diseases associated with it down to a minimum, correct rotation should be practised. No two crops of the same family should follow each other in succession. Though it may not always be a perfect solution, it is practically always safe to alternate in any order the principal classes of vegetables—tap roots (carrots, parsnips, etc.), fibrous roots (cabbage, cauliflower, etc.), tuberous roots (potatoes and kumaras), and legumes (peas and beans).

The need for keeping a record of gardening activities cannot be overemphasised. This information can be kept in a notebook and should include at least the following headings: Vegetable and Variety, When Sown, When Transplanted, Planting Distances, Crop it Followed, When Ready for Use, Yield, and Remarks (manure, frost, etc.).

Artichoke (Chinese)

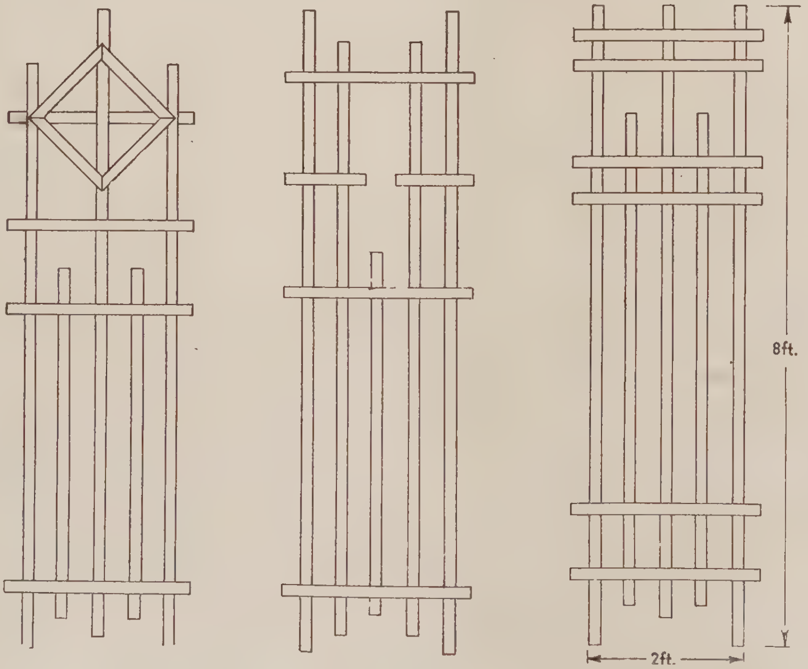
The Chinese artichoke (*Stachys tuberifera*) is, like the Jerusalem artichoke, not a true artichoke. It is not often grown in home gardens in New Zealand, but the small corkscrew-like tubers it produces are generally considered by those who have tried them to have an agreeable flavour. The plant is a hardy perennial with roots swollen at the ends into tubers. It is very easy to grow, as it usually does quite well even in comparatively-poor soil. The tubers should be planted in early spring 9in. apart and 4in. deep in rows 18in. apart. A moderately-rich or lightly-manured soil is best, as too much manure causes coarseness. When the foliage has died down the tubers should not be lifted until required, for they deteriorate rapidly on exposure to the air. If it is necessary to lift them some time before they are required, they should be covered at once with soil or damp sand.

Artichoke (Jerusalem)

The Jerusalem artichoke (*Helianthus tuberosus*) is actually a tuberous-rooted variety of sunflower. It has a high nutritive value and deserves to be more commonly grown. The flavour is rather sweet and when the vegetable is properly prepared for the table it is relished by many people. The quality of the stock available in New Zealand is somewhat variable and there is often a great deal of difference in culinary value and yield between lines. The use of inferior methods of cooking and the growing of the poorer-quality strains have prejudiced many against artichokes. The tubers, which are like rather knobbly potatoes, will grow in almost any soil, provided it is not too wet; the lighter types of soil are preferred to heavy clays. Artichokes respond well to liberal manuring, for in good conditions they produce heavy crops of tubers and tops up to 10ft. high. Use can be made of the top growth for a windbreak if it is supported by wires.

Planting should be done in August or as soon as the ground can be got in condition. The tubers, either cut or whole, are set 15in. apart and 4in. deep in rows 30in. apart. Artichokes are hardy and practically disease-free and can be left in the ground until required. Care should be taken when digging to ensure that all tubers and pieces of tuber are removed; otherwise they will start into growth to the detriment of the succeeding crop. Three pounds of tubers are sufficient to plant 100ft. of row.

SIMPLE DESIGNS FOR TRELLIS



[*Adapted from the Ontario Agricultural College's Extension Form No. 4.*

Three types of garden trellis. The uprights are ⅜in. x 1½in. and the cross-pieces are ¼in. or ⅜in. x 1½in.

Asparagus

Established beds of asparagus should be dressed with compost or well-rotted farmyard manure if the work has not yet been done. In the North Island new beds are usually planted in August, but where the ground is reasonably dry it is possible to plant toward the end of July. The bed should be 36 to 48in. wide and well drained. The site should first be trenched deeply and if necessary drainage improved by the addition of open material such as shingle or stones or the installation of field pipes leading out to a lower level where excess water can drain away. All perennial weeds and grasses should be removed and such material as well-rotted stable or farmyard manure dug into the bottom spit. Popular varieties of asparagus are Mary Washington, Martha Washington, Connovers Colossal, and Paradise.

Broad Beans

There are few hardier vegetables than broad beans and if sown early they mature at a time when most vegetables are scarce and lacking in variety. If a successional supply is required, or if seed has not yet been sown, it should be put in without delay, as advised in last month's issue of the "Journal."

Brussels Sprouts

Tall varieties of brussels sprouts usually require support if they are growing in exposed positions. Well-grown plants carrying a heavy crop are worth staking individually, but for most crops at this period earth banked against the stems usually gives satisfactory support. Sprouts should be picked systematically from the bottom, and to permit a good circulation of air about the plants leaves should be removed as they begin to turn yellow; at that stage they snap off cleanly at the junction with the main stem. Healthy green leaves are usually best left. If grey aphis is troublesome, a spray made up of nicotine sulphate (1 fluid ounce plus 1oz. of soap to 4 gallons of water) used on a still and preferably warm day will be found effective in combating the pest.

Cabbage

Probably the majority of home gardeners buy their cabbage plants when planting time comes, but those who prefer to grow their own seedlings can now sow a quick-maturing variety such as Golden Acre. A warm, sheltered situation with favourable soil conditions is necessary and where these conditions are lacking it is advisable to use a cold frame or well-ventilated glasshouse. Sow in boxes containing 4 to 5in. depth of light, open-textured soil so that when the plants are sufficiently developed they can be removed from under the glass and hardened off. Conditions should encourage rapid germination and growth. The plants should be thinned if crowded, as the desired type of seedling for transplanting is one with well-developed roots and strong, rather stocky stem and leaf growth.

Spring Cabbage

Established crops of spring cabbage should be encouraged to make strong, quick growth by regular applications of liquid manure. If organic liquid manure is not available, sulphate of ammonia or nitrate of soda at the rate of 2oz. to 4 gallons of water can be applied. The spring or pointed type of cabbage can still be set out in July and this is a practice that is favoured by some growers on the main-crop class of land in districts where the winters are severe. If well-grown seedlings are planted out in richly-manured, well-drained soil, the plants mature very quickly.

Cauliflower

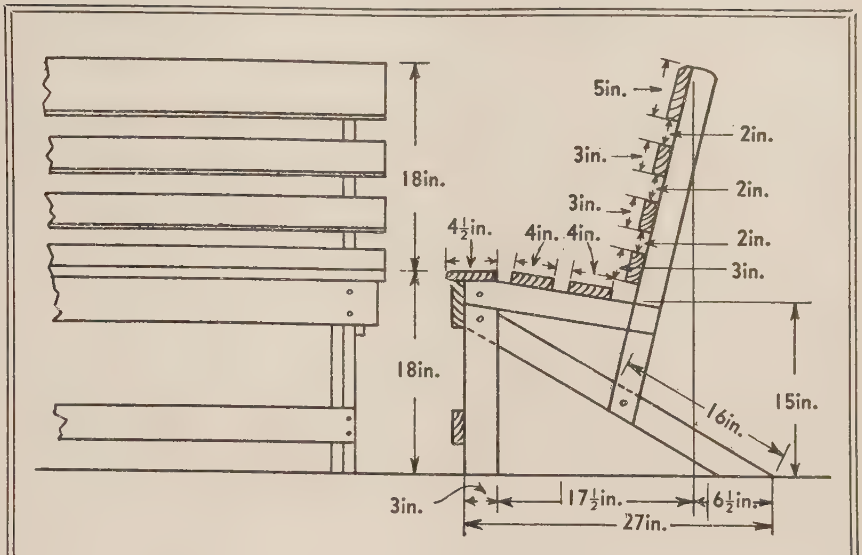
Most of the recommendations for growing cabbage apply also to cauliflower, though cauliflower is a more tender plant and the consequences are likely to be more serious if the plants receive a check caused by such conditions as dryness, severe frost, cold, or injury during transplanting.

Garlic

It is usual to grow garlic from cloves (the divisions of the bulbous root) planted in July or August about 2in. or a little more than their own depth below the surface of the soil and 6in. apart in rows 12in. apart. The soil should be rich and well drained. Garlic is a very pungent variety of onion and is unexcelled for using in sauces, pickles, and for flavouring.

Herbs

No home garden should be considered complete without herbs. Sage, mint, parsley, chives, and thyme are most in demand, but there are other useful and interesting herbs that are easy to grow, require little space or attention, and the seed or vegetative parts of which are obtainable from most good seedsmen. July is a good time to plan the establishment or extension of the herb garden. For the home gardener who can spare the space a small herb garden is well worth while, for apart from their culinary value, most herbs are aromatic and interesting plants. In the following list, which gives some brief cultural directions for various herbs, together with the uses to which they are usually put, (a) indicates that the plant is an annual or is usually grown as one and (p) that it is a perennial.



[Adapted from the Ontario Agricultural College's Extension Form No. 4.

An easily-made garden seat.

Angelica (p): Sow in early spring and later plant 15in. apart in a cool, moist position. The tender stems and mid-ribs are used for cooking and confectionery and are sometimes blanched and eaten like celery. The seeds are used for flavouring. Germination is usually slow.

Aniseed (a): Sow in spring in a favourable situation in drills 6in. apart. Thin the plants in the rows to 3in. apart. The leaves are used for seasoning and garnishing and the seed for confectionery.

Balm (p): Divide in early spring and plant out 15in. apart in a favourable situation. It is also grown as an annual. The young shoots are occasionally used in salads, and tea or balm wine is made from the leaves.

Basil, sweet (a): Sow in gentle heat and plant out 8in. apart in rows 1ft. apart when frost danger is past. The aromatic leaves and flower stems are used for seasoning and rarely for salads. To prolong the life of the plant the flower stems should be cut as they arise. They can be tied into bundles for winter use.

Basil, bush (a) is a dwarf-growing variety used for the same purpose as sweet basil. Seed can be sown in late spring.

Borage (p): Sow seed in spring or autumn in good soil or divide the roots. The leaves are used in salads, to which they impart a flavour somewhat like that of cucumber; the flowers are used for garnishing and flavouring. Set out 15in. apart. The plants usually do well in the poorer soils.

Caraway (p): Seed is sown in rows 1ft. apart in autumn and later thinned to 1ft. apart. The seeds are used in confectionery and for perfume.

Chervil (a): Successional sowings from spring onward are necessary to ensure a regular supply of tender leaves. Sow in drills 8in. apart and ensure that the plants do not become dry at the roots. The leaves are used for salads, garnishing, and other culinary purposes.

Coriander (a): Seed is sown in spring. The seeds are used similarly to those of the caraway; young leaves can be used in soups and stews. The plants should be thinned to 18in. apart in rows 3ft. apart.

Chives (p) are propagated by division. The plants are very useful as a mild substitute for onion in salads and soups. They should be set out 12in. apart and cut regularly in succession to ensure a supply of young leaves.

Dill (a): Sow the seed as soon as it is ripe or in spring in rows 1ft. apart and later thin the plants to 1ft. apart. The seeds have a pungent odour and are used for flavouring.

Fennel (Florence), finochio (a): Sow in spring or early summer in rows 12in. apart and thin or transplant to 6in. apart. The swollen leaf stalks are sweet and are eaten either boiled or raw. The plants are best earthed up around the base.

Horehound (p): Sow in spring and thin the plants to stand 15in. apart, or divide and replant the root stock. The extract is mainly used for subduing irritating coughs.

Hyssop (p): Propagation is by seed sown in spring or by division of the root stock. Plants are set out 12in. apart. The leaves and young shoots are used in the kitchen and the leafy tops and flowers when dry have a medicinal value. It may be used as an edging plant in warm, dry situations.

Marjoram, pot (*Origanum onites*) **(p):** Sow in spring and set out plants 10in. each way: The aromatic leaves are

farm-fresh potatoes

RIGHT THROUGH THE WINTER

At last you can store potatoes by the bag-full or box-full right through the winter without shrivelling or the growth of sprouts. DORMATONE, the remarkable new Sprout Preventer, keeps potatoes firm, farm-fresh and flavourful for six months or more . . . there's no waste from sprouts or shrivelling.

DORMATONE is a hormone product, and is therefore definitely NOT harmful in any way . . . nor are cooking qualities impaired if it is applied before the potatoes begin to sprout.

DORMATONE is easily applied—just dust the white powder over the potatoes and then store them. It is economical, too—a 4oz. packet costing only 3/6 will treat a 1¼cwt. sack.

Buy a sack or two of potatoes when the price is right, dust them with DORMATONE, and you'll have firm, sprout-free potatoes right through the winter.

Ask your Seed Supplier or Store for—

Dormatone

PREVENTS
Dormatone
SPROUTING
Dormatone
Dormatone

For further information write to

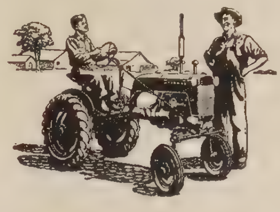
IVON WATKINS LTD.

32-34 Currie Street - New Plymouth

Also Manufacturers of Weedone, Wee-Dust, Rootone, Fruitone and Transplantone.

"Mowed 1¼ acres in an hour on a ½ gallon of fuel with my FARMALL CUB"

Says Mr. R. G. Buckleton, well-known Upper Hutt farmer, in a letter to International Harvester.



LOOK AT THESE FEATURES

On Pneumatic Tyres, 4.00 x 12 front, 8 x 24 rear; Adjustable Front Axle; Muffler; Swinging Drawbar; Front and Rear Wheel Weights; Belt Pulley; Power Take Off; Electric Lights and Starter.

PRICE complete with all equipment listed above—

£287/5/-

(Price subject to change without notice).

FULL LINE OF MATCHED DIRECT CONNECTED PLOUGHING, CULTIVATING AND MOWING UNITS AVAILABLE.

F.O.R. Auckland, Palmerston North, Wellington, Christchurch & Dunedin.

Farmall Cub . . .

CUB IN SIZE BUT A BEAR FOR WORK

INTERNATIONAL HARVESTER COMPANY OF N.Z. LTD., Auckland, Wellington, Palmerston North, Christchurch (Head Office) and Dunedin.

New remedy
containing
"GAMMEXANE"
destroys
LICE
& OTHER PARASITES

"Gammexane" is a remarkable new insecticide which gives positive control of external parasites on all farm livestock. Non - poisonous, non - irritant. When used on cattle, will not taint milk. Clean up parasitic infestation with COOPER'S LOUSE POWDER (containing "Gammexane")

COOPER'S
LOUSE POWDER
CONTAINING
"GAMMEXANE"

COOPER'S

LOUSE POWDER

Containing "GAMMEXANE" gamma BHC

Obtainable in handy duster-top 1lb and 2lb cartons from Merchants and Stores, or write—

COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD., Box 599, Auckland.

used both green and dried for flavouring. It is commonly grown as an annual.

Marjoram, sweet knotted (*Origanum majorana*) is usually grown as a half-hardy annual. Plant out 12in. each way. It is used for culinary and medicinal purposes.

Mint (p) is usually propagated by rooted cuttings of the creeping stems. In gardens inclined to be dry it should be planted under or near the water tap. Its tendency to spread where conditions suit it can be overcome by planting it in a bottomless box or a section of a steel drum sunk in the ground. It is one of the commonest herbs for garnishing and flavouring.

Parsley (a): Sow in spring and again in autumn. Transplant or thin 10in. apart. Germination is often slow. It is used for flavouring and garnishing.

Pennyroyal (p) is propagated from the creeping underground stems or from cuttings. The plant has a medicinal value and the tender tops are used for seasoning. The rows should be 12in. apart, with the plants 8in. apart.

Peppermint (*Mentha piperita*) **(p):** Culture is similar to that of mint and pennyroyal. It is used for flavouring.

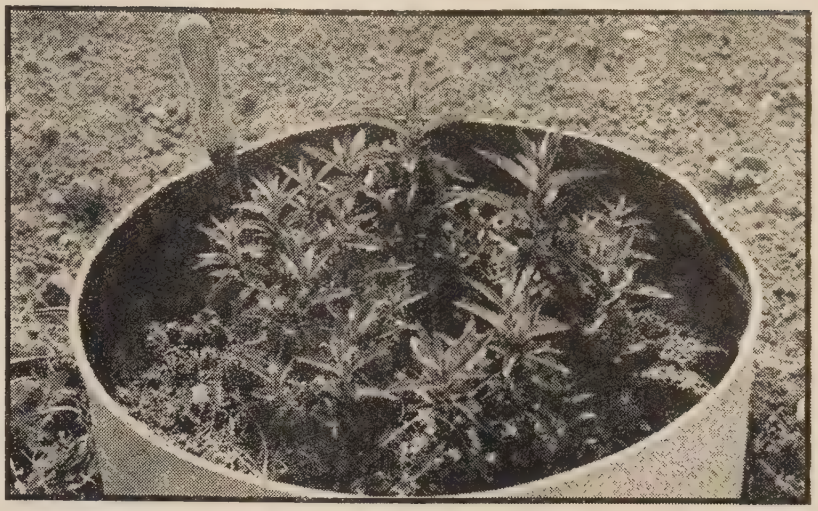
Purslane (a): Seed is sown in spring and the plants are set out 6in. each way. The leaves are used in salads or are pickled or cooked.

Rosemary (p) is propagated by cuttings or by seed sown in spring. It is mainly used for its perfume, though occasionally it is used as a garnish or in seasoning. It should be planted in a sunny situation.

Rocambale (p): Treatment and culinary use are similar to those advised for garlic, though the flavour is milder.

Rue (p) is a hardy evergreen shrub propagated by cuttings or seed sown in spring. Set out at least 18in. apart. It is used for seasoning and medicinal purposes. It does well in a deep, sandy loam into which limy rubbish has been mixed and should be kept pruned in shrubby form and not allowed to seed.

Sage (p): Propagation is best effected by cuttings from good stock, though it is easily grown from seed sown in spring. Large-leaved strains that flower little or not at all should be chosen and the plants set out 18in. apart in a warm situation. It is a commonly-used herb in most kitchens.



[Green and Hahn Ltd. photo.

To prevent mint from spreading throughout the garden it should be grown in a section of a steel drum or bottomless box sunk in the ground.

[Green and Hahn Ltd. photo.

Chives are very useful as a mild substitute for onion in salads and soups.

Savoury, summer (a): Sow in spring in drills 12in. apart and thin to 6in. apart. It is aromatic and is used in seasoning.

Savory, winter (p) is a hardy evergreen shrub propagated by seed or cuttings. Set out 15in. apart. It is used similarly to the summer variety.

Sorrel (p) is propagated by seed in spring or by division. The plants should be set out 6in. apart in rows 12in. apart in a moist soil in spring. It is used alone or with spinach in soups, stews, or salads. The flower stems should be pinched back. The large-leaved or French sorrel (*Rumex scutatus*) should be chosen.

Tansy (p) is propagated by cuttings or seed sown in early spring. The flower spikes should be kept pinched back and leaf growth encouraged. The young leaves are used for flavouring and medicinal purposes. Plants should be set out 15in. apart.

Tarragon (p.) is propagated by division of the root stock. Plants should be set out 12in. apart. The leaves and tops are used in salads, soups, and pickles and for imparting a flavour to vinegar.

Thyme, common (p) is propagated by division in spring or from seed. It is one of the commonest of the culinary herbs. It makes an excellent edging set out 12in. apart on a dry border.

Thyme, lemon (p) is usually propagated by division of the stumps in spring. Its culinary use is similar to that of common thyme.

Horse-radish

The value of horse-radish as a relish makes it well worth growing where space permits. Half a dozen roots are sufficient for the average family. Horse-radish is propagated by crowns or root cuttings usually about 6in. long and not thinner than a lead pencil. Though it is a perennial, it is best treated as an annual, for if left, it tends to encroach on nearby crops.

THE HOME GARDEN IN JULY

[*Green and Hahn Ltd. photo.*

A commonly-used herb, sage can be propagated either by cuttings from good stock or by seed sown in spring.

It can be planted any time from autumn until spring in deeply-dug, richly-manured soil and by the following autumn large, succulent roots will have developed. Rows should be 15in. apart, with the roots 12in. apart in the rows.

Lettuce

Except in the most-favoured districts, it is advisable at this time of year to sow lettuce in a box in a frame or cool glasshouse, or if such facilities are lacking, in specially-prepared soil in a sunny, sheltered part of the garden. Lettuce tend to be tough and stringy if grown slowly, and if checked, they often make poor growth afterward and fail to heart properly. They should therefore be encouraged to make rapid growth by mixing with the soil a liberal supply of well-rotted organic material such as compost or farmyard manure and by providing good drainage and cultivation to ensure good soil aeration and consequently maximum soil temperatures.

Onions

In districts where it is customary to sow the onion main crop in autumn plants can be set out 3 to 4in. apart in rows 12in. apart if conditions are favourable. In most southern districts the main crop is sown in September, but in favourably-situated gardens where soil conditions are good a small early sowing may be made toward the end of the month. The onion bed should have been thoroughly cultivated and preferably manured in the autumn with well-rotted stable or farmyard manure. The onion requires a firm bed, but the texture of the soil should be fine and crumbly; good drainage is essential. Though the onion bed should be firm, it should not be consolidated so that a crust is formed. The amount of firming will therefore vary according to whether the soil is light or heavy or is inclined to be dry or fairly moist. Light, dry soil can be consolidated by treading, usually with a shuffling walk; heavy soil, especially if it tends to be wet, requires very little firming—it is easy to make it too firm and to form a crust. Rain usually soon settles it.

Where there is insufficient organic manure a dressing of bonedust at the rate of 3oz. to the square yard and of superphosphate at the rate of 2oz. to the square yard forked lightly into the soil surface is advantageous. In addition, because of its potash content a heavy dressing of wood ashes should prove beneficial on most soils. Onion seed should be sown thinly ½in. deep in rows 12in. apart. Half an ounce of seed will sow about 100ft. of row.

Peas

In districts where weather conditions are favourable an early sowing of peas may be made in well-drained, preferably medium to light soil. Peas do well in cool, not cold, weather, but losses are common with early sowings because of the attack of soil-borne diseases, which are favoured by the inability of the seed or young plant to make immediate vigorous growth in the cold, wet soil, which is so often a concomitant of early sowing. Peas for early sowing should be dressed with a suitable seed protectant such as red or yellow copper oxide or copper carbonate in finely-powdered form. Care should be taken to ensure that the seed is only just coated. Peas repay good cultural methods, and the ground should be deeply dug and of good humus content. The seed should be sown in a shallow trench in the bottom of which it should be pressed 1in. deep. In very light soils the seed can be planted a little deeper, but for early sowing shallow planting is usually preferable. The seed can be zig-zagged 2 to 3in. apart in rows 20 to 36in. apart according to height of the variety. One pound of seed is sufficient to plant about 100ft. of row. There are several good early varieties, but probably William Massey is the most popular.

Potatoes

Stored potatoes should be sorted over to eliminate rotted ones and where the tuber moth is likely to be troublesome to guard against infestation. Points of infestation of

[*Green and Hahn Ltd. photo.*

Parsley should be sown in spring and again in autumn, but is often slow to germinate.

[*Green and Hahn Ltd. photo.*

Thyme is propagated by division of plants in spring or from seed. It can be planted either as a single bush or as an edging.

tubers infested in store are usually the eyes, where the eggs are laid. The larvae or grubs usually work at first just under the skin, later tunnelling through the tubers and leaving their excrement behind in the tunnels; the damage caused provides a congenial environment for organisms of decay. As the moth is a night flyer, it is seldom seen during the day unless disturbed. It is generally grey, with the forewings more or less spotted and mottled, the hind wings being narrower and buff. The wing-spread is a little more than ½in. Moths generally hide under rubbish or loose lumps of soil during the day.

Regular picking over of potatoes in store where infestation is suspected is very important, for under favourable circumstances the development of the life cycle of the moth may continue throughout the whole year or as long as the potatoes contain enough food to mature the grubs. Though the eggs, which are minute, white, and glistening, are easily recognised, and may be deposited in batches of up to 30 in the eye or on any rough scar of the potato, the first stages of infestation after the eggs have hatched are often rather difficult to detect, for the entrance hole is very small and is webbed over. Later a pink coloration can usually be detected around the injured eye, and excrement can be seen held in the web at the entrance of the burrow.

Where infestation is too far advanced or time does not permit picking over the potatoes they can be fumigated with carbon bisulphide. Place the potatoes in a large container (a tin or washhouse copper) that can be made practically airtight and put on top of them the sack later to be used for storing. Pour on the carbon bisulphide at the rate of 1 fluid ounce to each 14 cubic feet of the container. Close the lid, make the container as airtight as possible, and leave for 48 hours. If the carbon bisulphide is used at greater strength, the tubers will be damaged. The vapour is highly inflammable and must be treated with caution. Fumigation should be repeated in 10 to 14 days to destroy any insects that may have emerged since the first fumigation. Larger quantities of potatoes can be fumigated under a good-quality tarpaulin firmly sealed to the ground or even in a shed that can be made reasonably gastight. Where tuber moth infestation is likely potatoes stored loosely on a shed floor should be kept covered with a closely-woven material and examined regularly for infestation. Tubers set out for sprouting and greening before planting can be protected by dusting with an insecticide containing rotenone (derris) or with a light dusting of arsenate of lead; hydrated lime also gives protection.

Rhubarb

If it is intended to make a new bed, rhubarb crowns should be examined from time to time, and if the buds are commencing to grow, the crowns should be split with a sharp spade and replanted 30in. apart each way with only one or two buds in each division. Established beds should be dressed with manure if this has not already been done. The preparation of new beds should be thorough, as rhubarb is a perennial and if new crowns are planted in ground that is poorly drained or inadequately manured or in ground from which perennial weeds such as convolvulus, couch, or oxalis have not been removed, results are likely to be disappointing. New beds should be liberally dressed with well-rotted farmyard manure or compost; blood and bone is satisfactory where the more bulky organic material is unobtainable. Rhubarb can be forced in any situation where there is adequate warmth. An early variety should be chosen and covered with a good-sized box or some straw to exclude frost and retain any available heat. Forced rhubarb has less development of the leaf-blade and the stalks are more tender and sweet.

Root Crops

Small early sowings of carrots, turnips, beetroot, and radish should be made as soon as soil and weather conditions are favourable. Seedlings make poor growth in cold, wet soil and it is best to delay sowing if conditions are not favourable; sowings made a little later when conditions are better usually come to maturity at least as quickly and the loss caused by adverse conditions is much less. A light, easily-worked soil is preferable for early crops. It should be well drained and rich in organic matter, but not recently dressed with fresh organic manure, as the roots are likely to fork. Sow ½in. deep in rows 12in. apart.

Good varieties for early sowing are:—

Carrots: Early Short Horn and Chantenay.

Turnips: Early White Milan and White Stone.

Beetroot: Egyptian Turnip-rooted and Early Model.

Radish: French Breakfast and Scarlet White-tipped.

Silver Beet and Spinach Beet

Though caution must be exercised in July in sowing all seed, silver beet and the closely-allied spinach beet are among the most suitable plants for early sowing. The soil should be well drained and cultivated and enriched with well-rotted organic material such as stable or farmyard manure. Outside sowing will usually be confined to specially-favoured areas or to northern districts, but elsewhere it is a good plan to make a sowing in a box placed in a frame. No time is then lost and when planted out the seedlings should not be less forward than those that were sown outside in more-favoured districts.

Spinach

Like silver beet or spinach beet, spinach is one of the hardier vegetables. Prickly-seeded spinach can be sown throughout the winter in well-drained and cultivated soil that is not too heavy, provided the seedlings can establish themselves without danger of being "lifted" by frost. Quick growth is essential to the production of good-quality produce and soil should be rich in well-rotted organic manure.

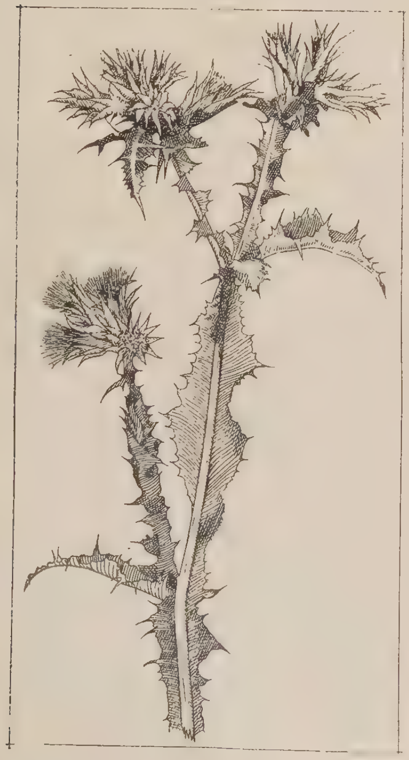
Spread of Winged Thistle in Waikato Pastures

By J. E. DAVIES,
Instructor in Agriculture, Hamilton.

THE invasion of pastures by weeds has increased until odd plants which grew in isolated localities only a few years ago have now spread sufficiently to present a serious problem. This costly experience has emphasised the urgent necessity of guarding against strange weeds being allowed to establish in case they multiply and become serious pests. Such weeds ultimately may claim a heavy toll on production, involving much labour and expenditure in their control and eradication.

The establishment and maintenance of a dense sward are essential for the control of winged thistle.

OF the troublesome weeds in the Waikato none has shown such a pronounced expansion on grassland in recent years as has winged thistle (*Carduus tenuiflorus*). The chief factors contributing to its spread undoubtedly have been the opening of pasture swards, such as was caused by drought conditions in recent summers, and the farm labour shortage which curtailed maintenance during the war and immediate post-war years. Several farms are overrun with this weed and concerted efforts are being made toward its eradication.



Description of Plant

Winged thistle is a strong, robustly-growing, annual plant of a spreading habit, with stems 4 to 6ft. high. The flowering stems are usually erect; the flower heads are somewhat small, placed singly at the ends of the clustered branchlets, and tinted pink to pale purple.

It can be recognised by its leaves, which are jagged and prickly at the edges and extend along the stems as comparatively-wide wings. The stems and undersides of the leaves are covered with a cottony growth. In the early stages the leaves are pale green and lie closely pressed to the ground. The leaves are not as hairy or as deeply dissected as those of the Scotch thistle, and as growth continues winged thistle is more bunchy and flowers much earlier.

Preventing Seed Dispersal

Winged thistle is a prolific seeder and, being an annual, its spread depends on seed dispersal and a suitable establishment medium. Therefore no better preventive measures can be advocated than taking all possible precautions to ensure that existing plants do not seed and encouraging practices that tend to build up sward density.

New pastures are specially liable to infestation by this thistle, and care in the laying down of new pastures cannot be over-emphasised. Certified seeds should always be sown to secure the best pastures. Before buying this seed, however, the accompanying purity and germination certificates should be inspected to ensure that winged thistle and other objectionable weed seeds are not present.

Cutting

Wherever winged thistle exists destruction before flowering is the key to its control. Grubbing, slashing, and mowing are commonly used by farmers with varying results.

Grubbing is only partially successful as plants may regrow from the tap root, necessitating repeated attention to prevent flower stem growth. Furthermore, grubbing commonly causes sward damage. Similarly, after slashing and mowing, regrowth from the crown is quick and regular attention is necessary to prevent flowering. The advantage of constant mowing when the plants are soft and luscious is that when they wilt they are readily eaten by stock.

Plants should be cut before they begin to flower, because if they are cut during flower formation there is a possibility of after-ripening.

Spraying

Sodium chlorate as a spray or dust has given successful results. As a spray a 5 per cent. solution is effective. For dusting, 5 parts of the chemical can be mixed with 95 parts of agricultural lime and a small pinch applied to young crowns and up to a handful on taller plants.

Hormone weedkillers are under trial, but as yet it is too early to comment on their effectiveness and economic use.

Winged thistle is not just a "cycle pest" but has become an annual worry. Its eradication would eliminate another weed menace which threatens to undermine the heritage of New Zealand's grassland.

Preparing and Packing Colonies of Bees for Transport

By I. W. FORSTER, *Apiary Instructor, Invercargill.*

IMPROPER methods in moving colonies of bees to new locations can endanger the welfare of the bees more than any other operation in ordinary apiary management. Though no set procedure can be laid down for shifting apiaries generally, the outline of safe methods given in this article should enable a beekeeper to select the one that suits him best.

THE packing of colonies is the most important part of shifting an apiary, for it is in that work that provision must be made for any contingency during transport.

The main requirements of a good packing system are:—

1. To give ample ventilation without exposing the bees to excessive cold or wet conditions.
2. To hold the component parts of the hive firmly together.
3. To ensure that the bees cannot escape.
4. To achieve quickness and convenience in packing and unpacking without causing undue damage to equipment.

Ventilation

Ventilation is most important, as the crowded population of a beehive readily succumbs to suffocation should ventilation be insufficient. Over-heating, even to a moderate degree, usually causes some loss of bee strength and may result in the death of any brood present. On the other hand, over-exposure during rigorous climatic conditions can have an equally-harmful effect. The amount of ventilation required must therefore be governed by temperature, colony strength, and the length of time the bees are to be confined.

An important consideration is that the more bees are agitated the greater is their need for ventilation. For this reason, if it is convenient, all packing operations except the final blocking of the entrances should be completed some hours before the actual shifting and if possible the day before. Loading on to a motor-truck can then be done with a minimum of disturbance.

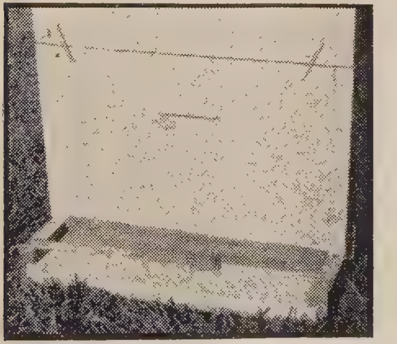


Fig. 1—A strip of wire gauze placed over the hive entrance will block the entrance and also give adequate ventilation.

The admission of light into the hive is also a factor which excites bees. Though this is unavoidable when it is necessary to screen the entire top, it must be realised that the distress sometimes shown by the bees and the heat generated as a result are greater than they would have been if the interior of the hive had been kept in darkness.

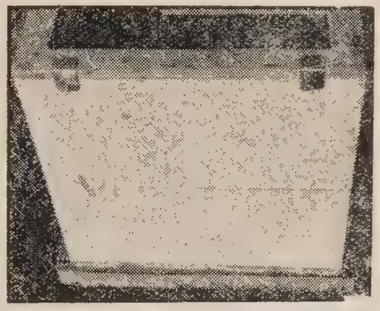


Fig. 2—A screen on top of the hive held in position by two galvanised lugs. The two supers are held together by crate staples.

During the off season, when the bees are more or less dormant, they can be moved fair distances without any special provision being made for ventilation. In such cases the hive entrances may be blocked with a strip of wood or by inserting a wad of sacking or paper. Sufficient air is usually obtained through crevices in the hive parts.

If conditions warrant more ventilation, a strip of wire gauze placed over the entrance will often suffice. The gauze can be tacked over the entrance, or if the equipment is sound and of standard dimensions, a strip about 2in. wide can be cut to a length that corresponds exactly with the width of the hive entrance. This strip may then be folded lengthwise and inserted in the entrance, as in Fig. 1. It should be folded to a point where the upper edge of the gauze curves away a little from the face of the hive box. No further attachment is then required for ordinary handling.

Screening the Top of the Hive

Where strong colonies are to remain packed for some time, or when warm conditions are likely to be experienced, it will be necessary to ensure that the bees have ample ventilation by removing the cover and mat, and by screening the top of the hive. In exceptional circumstances it may be necessary to screen both top and bottom. The screen usually consists of a piece of wire gauze tacked to a wooden rim the size of the top of the hive. This screen may be attached by nailing or screwing it into the upper edge of the hive box, but a better method is to attach a lug of galvanised iron about 1in. wide so that it laps down the side of the box about 1½in. (Fig. 2). A hole is punched near the lower end of the lug and a light nail is partly driven in and turned over.

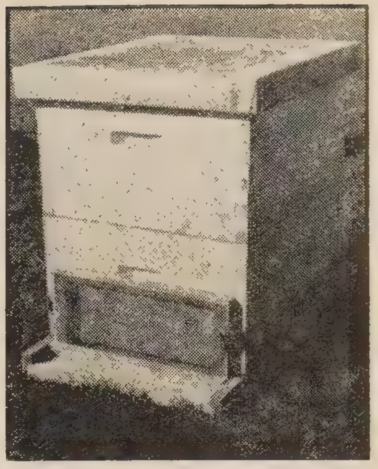


Fig. 3—An entrance screen not only provides ventilation, but allows the bees to cluster up the front of the hive.

A single thickness of sacking or scrim can be used in place of the wire gauze screen and will give fairly good ventilation. As these materials tend to lessen the amount of light admitted to the hive, the bees remain calmer and correspondingly cooler. However, if bees are confined in scrim-covered hives for a long period, there is a danger of their chewing their way through.

The use of scrim or sacking to cover the top of the hive is most convenient when equipment is unsound, as it can be made to fit over irregular surfaces or broken edges.

An entrance screen extending up the front of the hive (Fig. 3) will also provide fairly good ventilation. The advantage of this method of providing ventilation is that the hive is subjected to a minimum of disturbance and the bees can adjust internal hive temperature within limits in the ordinary way, yet should conditions require it, a large number of bees can cluster up the front of the hive, thus relieving the pressure within.

This type of screen is best made from 1in. x 1in. slats. The height of 6½in. leaves the handgrip clear, and the width of 14⅛in. is suitable for use with a standard bottom board. The bottom bar of the frame is nailed to the face of the side pieces so that it does not block the entrance. Galvanised iron lugs may be used to attach the screen to the hive when placed in position.

PACKING BEES FOR TRANSPORT . . .

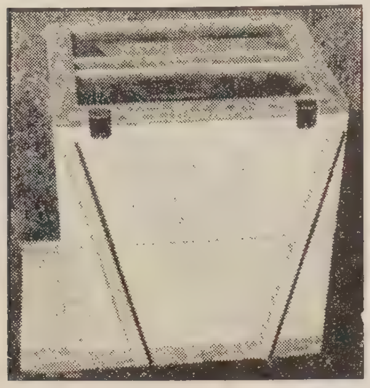


Fig. 4—Wooden slats placed two on each side of the hive hold the hive parts together securely.

This screen can be conveniently used only when equipment is of a standard size.

Packing

The first consideration in packing should be the stability of the frames within the boxes. If they are the self-spacing type, there will be no need for any further precaution. Simplicity frames, however, tend to slide about unless held in place by burr comb and propolis. Any strong movement to one side of the hive causes crushing of bees and the possible loss of a valuable queen. Much brood can also be lost under these conditions, as the closeness of the combs will prevent the nurse bees from having access to their young charges.

Simplicity frames may be held rigid by tacking a piece of tin or thin wood across them, with a small nail holding each top bar. They can also be held fast by simply wedging paper along the ends of the top bars and pushing it down between the frame lugs to the hive rebate.

The next step, which is equally important, is the attaching together of the external parts of the hive. The bottom board may be attached so that it remains in its normal position at the base of the hive. When ventilation has been provided for at the top a simple plan is to invert the hive cover, lift the hive off the bottom board, and stand it in the cover; the bottom board may then be carried separately. The straight-edged type of cover that sits hard down on top of the frames is not entirely suitable for this purpose, but those with a lath around the inside which rests on the edge of the hive body and thus allows an air space of about 1in. are ideal. When the cover is used in this way the weight of the hive is usually sufficient to hold it firmly down into the cover, but if necessary a light nail can be driven through the cover rim into the hive body.

If the bottom board is left on the hive, it will require to be attached to the bottom box, as will any supers and the screen if one is used.

Crate staples (see Fig. 2) provide a fairly secure attachment and have the advantage that they do not protrude beyond the width of the hive. Wooden slats 1in. x ½in. placed two on each side of the hive as shown in Fig. 4 and nailed to the bottom board and to each box hold the parts together securely and are popular for the packing of hives.

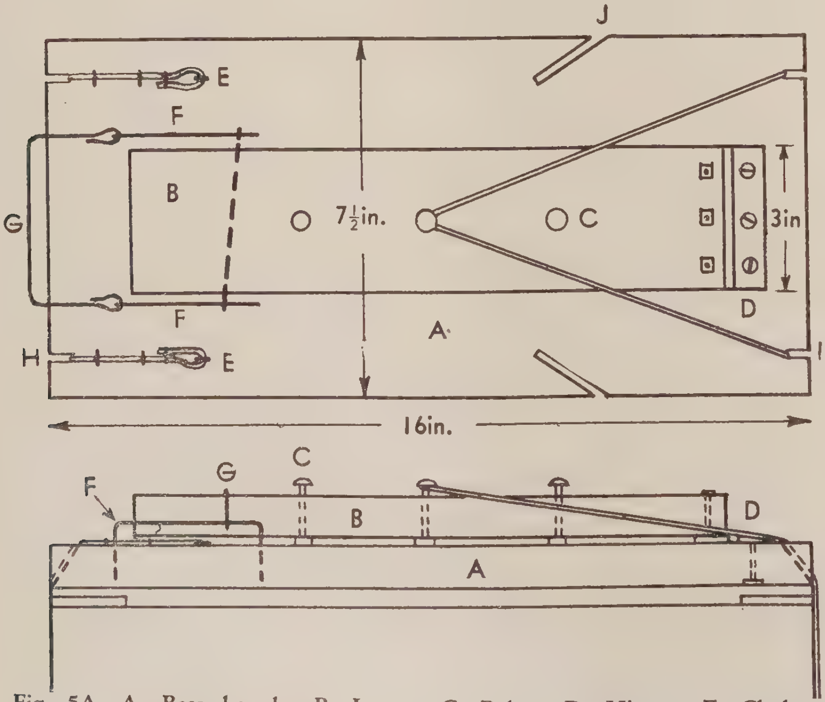


Fig. 5A—A—Base board. B—Lever. C—Bolts. D—Hinge. E—Clothes line. F—Wire slides. G—Wire loop. H and I—Grooves. J—Angle slots.

Easily-applied Clamp

The clamp shown in Fig. 5, which was designed by Mr. W. Herron, of Waikaka, holds bottom board, hive bodies, and screen firmly together and can be quickly and easily applied and removed.

The base board (Fig. 5A), which is placed on the top of the hive to be packed, is 7½in. x 1in. x 16in. The lever (B) is a piece of board 3in. x 1in. x 1ft. through which three ¼in. bolts 1½in. long are bolted at intervals of 2½in., with the heads (C) protruding above the upper surface. The lever is attached by a 3in. butt hinge (D) to a point on the base plate 1½in. from the end and half-way across its width.

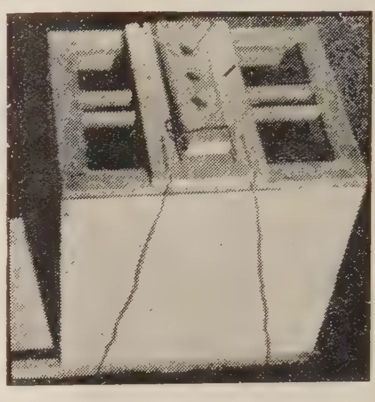


Fig. 5—This clamp holds hive parts together firmly and has the advantage that it is easily applied and removed.

The two ends of a length of wire clothes line 11ft. long are attached at E. The doubled end is carried down under the bottom of the hive and up the other side, where the looped end is hooked over the most suitably placed bolt-head of the three. The lever is then pushed down to tighten the wires. The spread of the wires under the bottom board can be adjusted to give the required strain when the lever is pushed down.

The ends of two pieces of No. 8 wire (F) are embedded in the base plate and stand up like a wide staple to form slides for the wire loop (G), which is used to hold the end of the lever after it has been pushed down to the horizontal position.

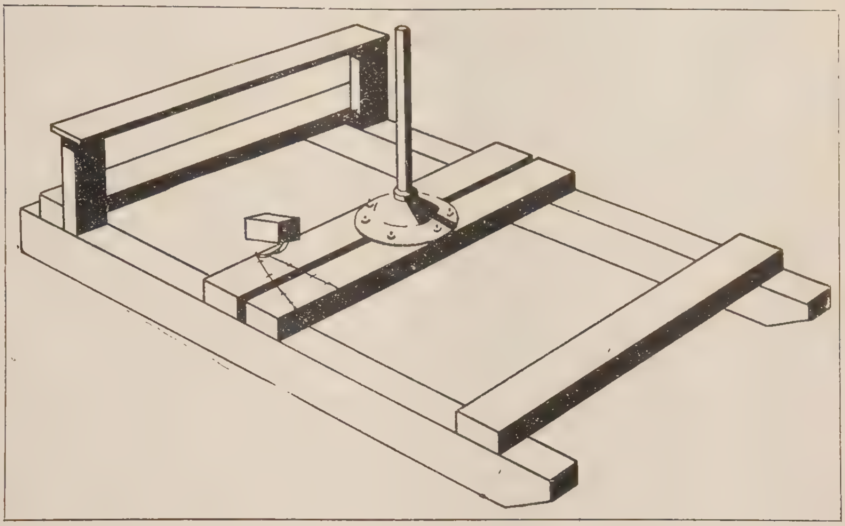
The grooves (H and I), two at each end of the plate, hold the wires in position and also allow a grip to be obtained on the edge of the screen, thus preventing any tendency of the screen to slide.

For packing a hive of smaller dimensions, such as a single storey, the wires are shortened by being wound back under the plate and up through the angle slots (J) before being finally led down through grooves H and under the hive in the ordinary way.

As commercial beekeeping necessitates the movement of apiaries from time to time, any equipment which will speed up or simplify the operation is of considerable help. Whatever method is used, it is better to spend extra time in packing than to run the risk of trouble with colonies in transit.

A Portable Coil Winder for Fencing Wire

WITH supplies of fencing wire still far short of satisfying the demand, much use is being made on farms of second-hand and salvaged wire. Such wire is usually difficult to handle, and this article by A. R. Dingwall, Instructor in Agriculture, Wanganui, describes the construction of a portable coil winder designed to facilitate such work.



Construction of sledge frame and spindle.

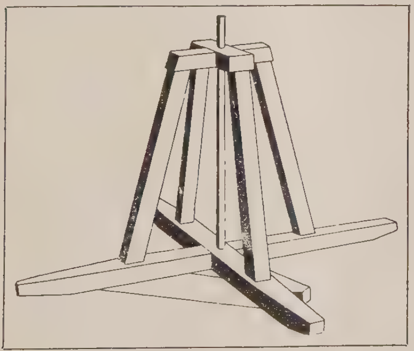
THOUGH the winter months are generally regarded as the "off" season in farming, they are usually fully occupied in attending to the winter welfare of livestock and in the repair, maintenance, and overhaul of machinery, equipment, farm buildings, and fences. Fences call for regular attention at this time of the year, particularly after years of wartime and post-war scarcities of materials and labour. Much necessary fencing construction and repair work have been unavoidably postponed from year to year in the hope that supplies of wire, staples, and labour would improve.

Recently the position has eased to some extent, though supplies of essentials are still far from adequate. For the erection of new subdivisional fences or the repair of those that have become unserviceable most farmers still must make do with materials on the farm. That usually means using second-hand wire, and may even necessitate dismantling non-essential fences and using the wire thus salvaged for immediate needs.

Handling Used Wire

The coiling of used wire when dismantling old fence lines and the relaying of this wire or even new wire are not always easy. Used wire, especially when being coiled by hand, often becomes almost unmanageable, the coils being loosely wound, cumbersome, and difficult to untangle when being paid out again along the new fence site. Barbed wire is especially troublesome.

A number of ingenious devices of varied design have been evolved with the object of surmounting these difficulties. One of these, of simple design and widely used, is the often crudely-constructed "spinning jenny," consisting essentially of two horizontal cross-arms at right angles, with four vertical removable pegs, one in a hole near the outer end of each cross-arm, the whole revolving round a perpendicular spindle mounted on a suitable framework and passing through the centre of the cross-arms. A tapering framework erected on the cross-arms, with the spindle passing up through the centre of the cross-arms and through the cross-pieces at the top of the frame, is an improvement. More elaborate designs consist of a wooden or iron frame reel set on a horizontal shaft in a supporting framework, the reel usually being revolved by a crank handle on the shaft to which it is fixed.



A plain unwinding reel.

Improved Design

Winders of such designs can prove satisfactory if soundly and solidly constructed, but the type described and illustrated in this article, though resembling the conventional reel types in general principles, has several special features that widen the scope of its usefulness as well as contributing toward efficiency. It has given good service in practice and is calculated to cause less wear on tempers than some of the winders in use today Salvaged parts such as are often to be found on the farm scrap heap or are readily obtainable from the local blacksmith or machinery exchange have gone into its construction. Measurements quoted are intended only as a guide; in most instances they can be varied with the materials available without affecting the design.

The winder is of the portable, horizontal-reel type. The wooden reel, revolving round a vertical steel shaft, is mounted on a sledge frame for convenience of transport by horse or tractor, and the whole is light enough to be easily manoeuvrable by hand when necessary.

The sledge is built of two 6in. x 3in. runners with 4in. x 2in. cross-members —one cross-brace near each end of the parallel runners, and two closely-spaced bearers at the centre of the runners. The sledge is about 4ft. long and 2ft. 9in. wide. Set on each runner and nailed to the runners and the front surface of the rear cross-brace is a short 4in. x 2in. upright carrying a 4in. x 1in. board for use in lifting and guiding the wire on to the reel. The height of this board is determined by the level at which the reel is set, the surface of the guide board being slightly higher than the upper surface of the bottom plate of the reel.

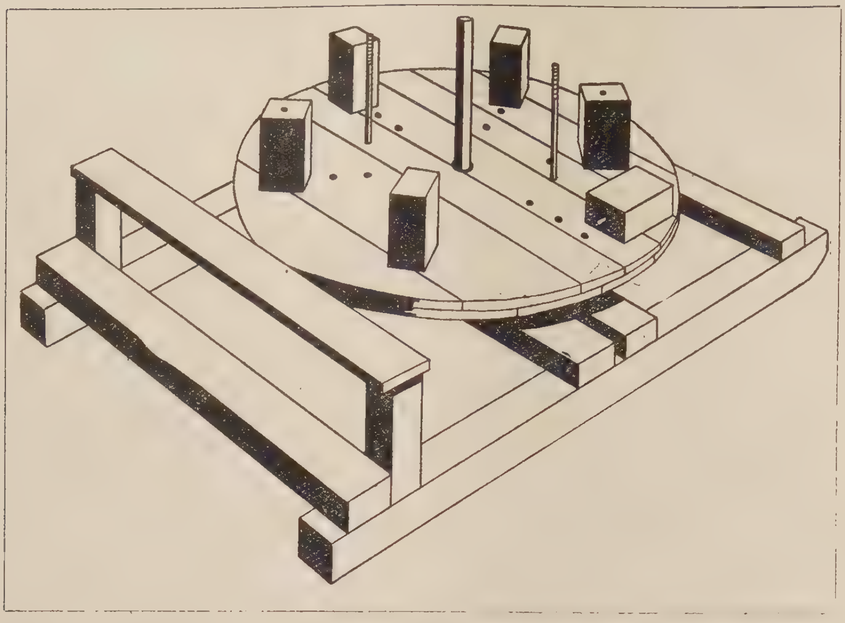
Centred on the two central cross-bearers and securely bolted to them is the iron flange plate carrying the spindle. The plate illustrated is a bearing bracket from an old disc plough, and a similar plate was used as a bearing for the upper end of the spindle. The stub axle brackets on some types of plough wheels or the iron flange plates used as a base for galvanised piping stands should serve equally well. If a pipe flange is used, a piece of 1 to 1½in. galvanised iron piping screwed into the flange would serve for a spindle, though in the model illustrated the spindle consists of an 18in. piece of 1¼in. steel welded into the centre hole of the bracket.

The diameter and length of the spindle are governed largely by the size of the hole in the base plate and by the over-all thickness of the reel plus the depth of the top bearing bracket. The spindle protrudes about 1½in. above the top bracket.

The lower plate of the reel is 2ft. 6in. in diameter and constructed of two layers of 1in. boards at right angles. Holes are bored through the centre to take the spindle and halfway between edge and centre on opposite sides of the spindle for two ⅝in. clamping bolts which protrude about 1½in. above the top plate of the reel.

The six spacer blocks are of 4in. x 3in. timber 6in. long. The length can be varied according to the thickness of the coils of wire to be wound

COIL WINDER FOR FENCING WIRE



Construction of lower plate of winding reel and spacer blocks.

or unwound, but it is essential that they all be the same length and have square-cut ends. The outer edges of the blocks may be bevelled or rounded if desired. Each block has a short, round, iron peg fitted into the bottom centre, allowing for adjustment to take or make coils of varying internal diameters. They fit into a series of evenly-spaced holes bored into the lower flange of the reel around the circumferences of concentric circles.

The upper plate of the reel is also of 1in. timber of the same diameter as the lower one. The iron bearing bracket to take the top of the spindle is bolted in the centre top of this plate, which is also bored to receive the two clamping bolts; square nuts are shown on these bolts in the diagram, but wing nuts might be more convenient. The top plate also carries the four wooden turning handles.

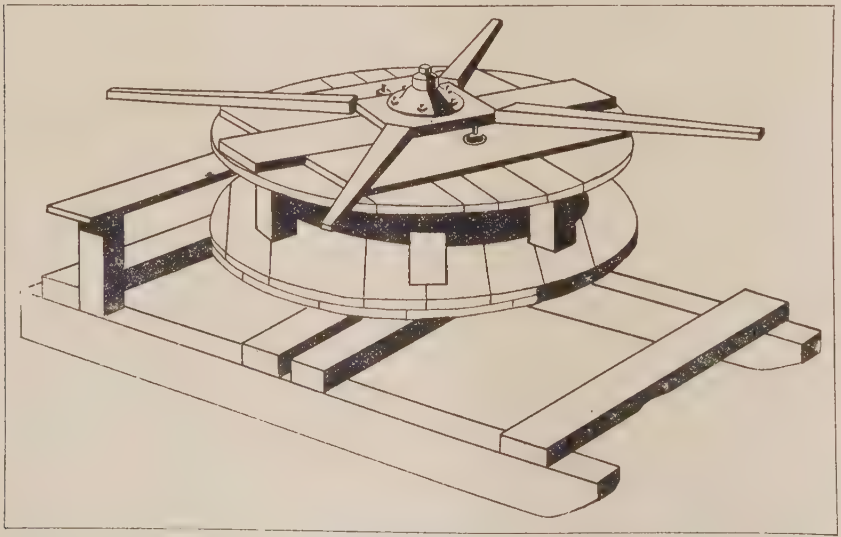
The wooden block fixed with number 8 wire to the centre cross-bearers, shown in the diagram on the previous page, is an improvised brake acting on the under surface of the lower plate and needed to control the speed of the reel at certain times when wire is being uncoiled.

Tying the Coil

Three pairs of post staples partially driven in, evenly spaced round the outside edges of the top and bottom plates, are used to take short lengths of light wire for tying up the coil when it has been wound. Before the wire to be wound is attached to the reel these binding wires are threaded through each pair of staples. The free end of the fencing wire is then attached to the reel by taking a hitch round one of the clamping bolts between the two plates. As the reel is revolved the wire coils round the circumference afforded by the spacer blocks, and the binder wires are drawn in toward this circumference with their ends remaining free through the staples. When winding is completed the ends of each binder wire are twisted together and the coil securely tied.

The top plate is unclamped and removed for adjustments to the spacer blocks or for fitting a coil that is to be unwound off the reel. When being coiled the wire passes over the guide board at the rear of the sledge and is attached to one of the clamping bolts. The winder is rotated by the handles in the manner of a ship's capstan.

New barbed wire is bought already wound on wooden spools and where conditions permit of such wire being drawn out from the spool along the fence line, instead of the spool being carried and the wire paid out along the line, the coil winder can be used conveniently by dispensing with the winder reel and slipping the barbed wire spool over the spindle.



The assembled reel.

NOTICE

THE PATENTS, DESIGNS AND TRADEMARKS AMENDMENT ACT 1939

ASSIGNMENT WITHOUT GOODWILL PURSUANT TO SECTION 24.

The Trademarks set out in the Schedule below were assigned on the 29th day of December, 1947, by AMERICAN CHEMICAL PAINT COMPANY, a corporation of The State of Delaware, of Brookside Avenue, Ambler, Pennsylvania, United States of America, Manufacturers, to IVON WATKINS LIMITED, a company incorporated under the laws of the Dominion of New Zealand, of 32 to 34 Currie Street, New Plymouth, in the said Dominion, Manufacturers and Merchants, *without the goodwill* of the business in which they were then in use.

REGISTERED TRADE MARKS

ROOTONE, No. 41715, Class 1 (Sch. 4)—Chemical products used in agriculture, horticulture, and forestry; manures (natural and artificial).

TRANSPLANTONE, 41716, Class 1 (Sch. 4)—Chemical products used in agriculture, horticulture, and forestry; manures (natural and artificial).

FRUITONE 41717, Class 1 (Sch. 4)—Chemical products used in agriculture, horticulture, and forestry; manures (natural and artificial).

WEEDONE, 41970, Class 5 (Sch. 4)—Chemical preparations for eradicating and killing weeds.

WEEDEX, 43304, Class 5 (Sch. 4)—Chemical preparations for eradicating and killing weeds and other growths.

TUBERTONE, 43305, Class 1 (Sch. 4)—Chemical products used in agriculture, horticulture, and forestry; manures (natural and artificial).

DORMATONE, 44021, Class 1 (Sch. 4)—Chemical products used in agriculture, horticulture, and forestry; manures (natural and artificial).

WEEDUST, 44608, Class 5 (Sch. 4)—Chemical preparations, including chemical preparations in solid form, for exterminating and killing weeds.

WEEDAR, 44993, Class 5 (Sch. 4)—Chemical preparations for eradicating and killing weeds.

The Rearing of Young Farm Animals

ORPHANS CAN BE RAISED SUCCESSFULLY BY HAND

GOOD care and management and a sufficiency of suitable feed ensure sound constitution, rapid growth, and resistance to many diseases in young farm animals. This article by J. Mullins, Veterinarian, Department of Agriculture, Masterton, deals with the rearing of animals up to weaning and some of the troubles which commonly occur. With the present emphasis on the production of food to ease Britain's plight, every animal possible should be reared and special mention is made of orphan animals, which, with careful attention to treatment, should be able to be reared by hand fairly successfully.

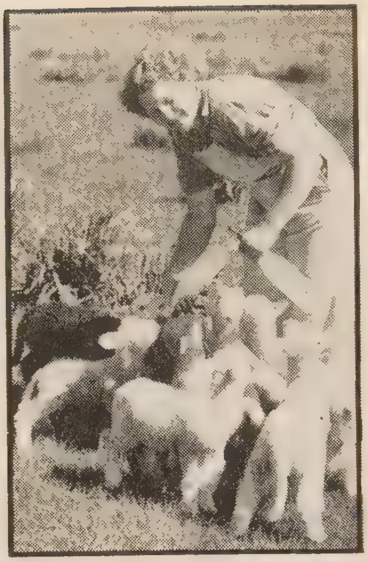
WITH the exception of the dairy calf, all farm animal progeny are nurtured and nourished by their own mothers for at least a few months before being weaned. Nature's method normally gives best results with the least trouble, but to fit in with dairy farming economy the calf is taken away at birth or very soon afterward and reared by hand.

Rearing of Orphans

Occasionally the young of other farm animals are left motherless (lambs frequently so), when a decision must be made whether to rear them or not, which will doubtless be influenced by a number of factors and, at least in the case of foals, by their breeding. A well-bred orphan foal is, of course, well worth the trouble involved.

The milk of the mother animal is specially secreted and constituted for its own young but is also suitable for the young of its own species in general, so for rearing orphans nothing can equal the foster mother. But except in the case of the orphan lamb the securing of a foster mother is usually impossible, so the task of hand rearing with modified cow's milk has to be undertaken. At first food must be given frequently and in small quantities, the amounts fed and the intervals between feeds being gradually increased. The following table shows the composition of animals' milks and gives an idea of the modification of cow's milk necessary to suit the orphans of other farm animals, the foal being the main consideration:

	Water	Mineral matter	Protein	Sugar	Fat
		Per cent.			
Cow	87.2	0.7	3.5	4.9	3.7
Mare	89.0	0.6	2.7	6.2	1.5
Ewe	80.8	0.9	6.5	4.9	6.9
Sow	81.0	1.0	5.9	5.4	6.7



[*National Publicity Studios photo.*

Orphan animals must be given food frequently and in small quantities at first, the amounts fed and the intervals between meals being gradually increased.

The milk fed must be fresh, at body temperature, and if possible from a T.B. tested cow.

For an orphan foal cow's milk (preferably of low test) may be modified by adding one-third of the volume of water, plus 1 tablespoon of sugar (not cane sugar) to every pint of the mixture. A little lime water may be added with advantage—about 1 fluid ounce to the pint. About ¼ pint of this mixture may be fed hourly for the first few days. After about a week

[*Sparrow Industrial Pictures Ltd. photo.*

Nature's method of rearing normally gives best results with least trouble, but to fit in with dairy farming economy calves are taken away from their mothers at birth or very soon afterward and reared by hand.

REARING YOUNG FARM ANIMALS

[National Publicity Studios photo.

A well-bred orphan foal is well worth the trouble involved in its rearing. The work should be made the responsibility of one reliable, painstaking person who takes a real interest in it, or the result may be a worthless runt.

six feeds daily should be sufficient, the amounts fed being increased gradually. When the foal is about a month old the sugar may be dispensed with. At about three months skim-milk may be substituted gradually for whole milk until at about four months all skim is used in quantity three times a day. The foal will have been taught to drink from a bucket or other vessel long before this stage, but in its early days the best method of feeding is by bottle with teat attached. All feeding vessels and accessories should be kept clean and boiled or steamed occasionally.

The foal will be subsisting largely on grass by the time it is four months old, having begun to nibble at about three weeks. Good-quality, clean, well-limed pasture which preferably has not been used much for other horses of late should be made available if possible. A daily ration of crushed oats should be fed in addition for the first year at least, and in cold, sunless weather a little cod liver oil is helpful.

The rearing of an orphan foal is best made the responsibility of one person, and a reliable, painstaking person who takes a real interest in the task, or the result may be a useless runt.

It is very important that the first milk, or colostrum, be fed to a dairy calf for the three or four days it lasts, as this is Nature's laxative and insurance against early infections.

Orphan lambs and piglets are not as difficult to rear successfully by hand as foals and usually do well on cow's milk of high test. As with a foal, small and frequent feeds are best at first, using a bottle and teat. After about a month three feeds a day are sufficient, in addition to suitable short pasture, and for the piglet a little concentrate may be introduced at about three weeks. At six to eight weeks the young pig will be subsisting on three feeds a day of skim-milk, with a little meal added, and a run on short pasture. Warm, draught-proof housing is essential for the pig.

Diseases and Hazards

Orphans, in common with other young farm animals, are subject to the usual diseases and hazards before they reach maturity, most of which will occur in the first year. Those troubles may be classified under three headings: Dietetic, bacterial, and parasitic.

Dietetic upsets include those caused by faulty feeding—overfeeding, underfeeding, irregularity, unsuitable and unbalanced feed, and the use of dirty, contaminated vessels. Indigestion, curds, scours, and resultant losses are not uncommon, and in young calves are caused by such haphazard feeding. The best method of feeding milk to calves is the bail and bucket system, by which each calf gets its share and no more.

Sometimes there occur severe and rapidly-fatal bacterial scours which may be predisposed to by faulty feeding but occasionally are primarily bacterial in origin. Infection through the unhealed navel of a newly-born calf is thought to be a frequent source of disastrous outbreaks. Infection through the navel is also responsible for the acute and usually-fatal form of joint illness sometimes occurring in foals and calves. In outbreaks of scours in young calves, isolate the affected cases (or better remove those still unaffected) and give them a dose of castor oil. Allow nothing but water until an improvement is shown, then gradually bring the diet back to full milk. One of the sulpha drugs is said to give promising results in these scours, particularly when they are bacterial in origin. Blood scours also afflict young calves, at times with fatal results; the action taken should be as for other scours in milk-fed young animals.

Red water in young calves may be a source of heavy losses. The passing of red water may not be noticed at first, the calves being found dead. The cause of this rapidly-fatal disease is not known, so prevention and cure are difficult.

Calf diphtheria is not common in New Zealand but occurs occasionally. Primarily it is an infection of the mouth, but it may extend into the alimentary canal, in which case it is frequently fatal. A foul-smelling, cheesy condition of parts of the tongue and mouth, dribbling, and lack of interest in feeding are the usual symptoms. Isolate affected calves and thoroughly sterilise feeding vessels, as the disease can assume a contagious form. Sucking between calves after feeding is a certain means of spreading calf diphtheria.

If any of the diseases mentioned break out, a veterinarian should be called.

Scours may occur in a foal when the mare is in oestrum or after rain. A newly-born foal sometimes suffers from retention of the meconium—the first faeces—in which case dullness, colic-like pains, and rolling are the usual symptoms. A dose of castor oil followed by an enema usually brings about expulsion of these hard balls of foetal faeces and uneventful recovery.

Diseases of Lambs

Pulpy kidney, or entero-toxaemia, is probably the most serious disease of forward young lambs. Losses from it may occur before docking but more usually some time after docking, though they can occur at any age in overfat sheep or lambs. The disease is caused by the production of a rapidly-fatal toxin in the bowel by bacteria which are normally present there but which assume this power in the sluggish intestinal tract of a high-conditioned lamb. Anything that checks such lambs helps to prevent pulpy kidney, but vaccination is probably the most reliable precaution and where losses are likely to be heavy is worth while. The name pulpy kidney was derived from the easily-broken-down condition of the kidneys in lambs dead of this disease, but that peculiarity is by no means constant.

Scabby mouth is another infection of lambs and young sheep, occasional outbreaks occurring in very young lambs with possibly serious consequences. Infected young lambs may not be able to suck or feed because of the inflamed and scabby condition of the lips, losses sometimes following. The ewe's udder may be infected from the lamb, possibly resulting in gangrene and death. This disease is caused by a virus and is highly contagious. Vaccination against scabby mouth is very effective and easily carried out.

[National Publicity Studios photo.

The lamb is usually the only orphan on the farm for which the securing of a foster mother is possible.

Arthritis—inflammation of a joint or joints—is a common disease of young lambs caused by navel or, more usually, docking wound infection. Losses rarely result directly from this disease, the lameness usually disappearing and the lamb beginning to thrive again after a few days. However, the affected joints remain enlarged and there is considerable deformity and wasting of the muscles in those regions, which will be condemned at the meat works later. It is difficult to advise on the prevention of arthritis in lambs with any assurance of success.

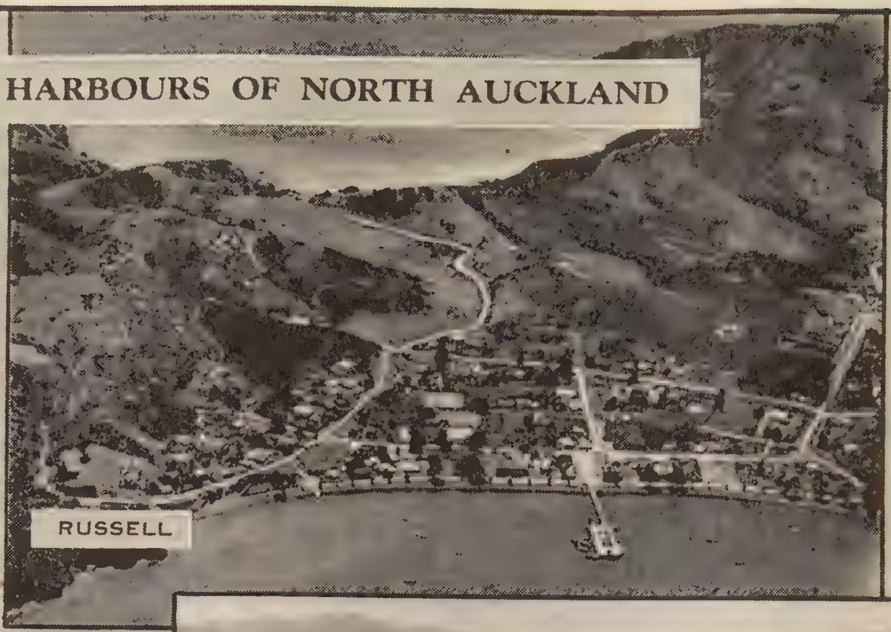
Apart from bacterial infections such as suipestifer, young pigs usually fare very well if reared under good conditions.

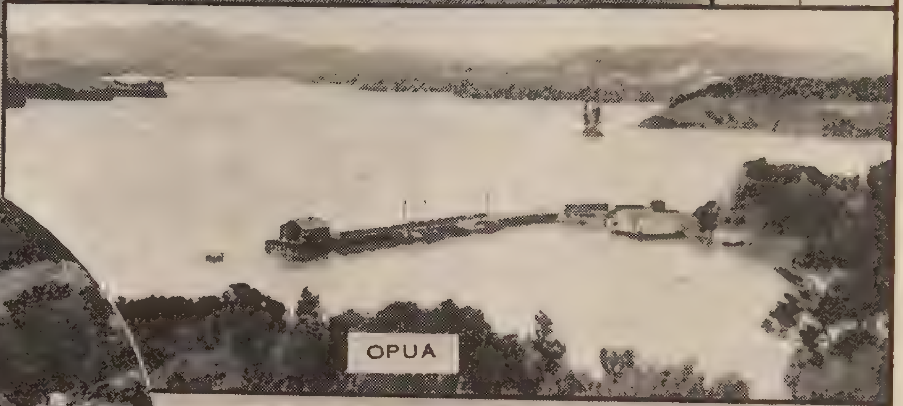
Tetanus, or lockjaw, characterised by general stiffness and rigidity of the body, invariably ending in death after a day or two, sometimes occurs in lambs. This disease is caused by the tetanus germ gaining entrance through the docking wound, symptoms usually appearing after a few days. Nothing can be advised beyond keeping docking operations away from yards, camping grounds, and other infected areas.

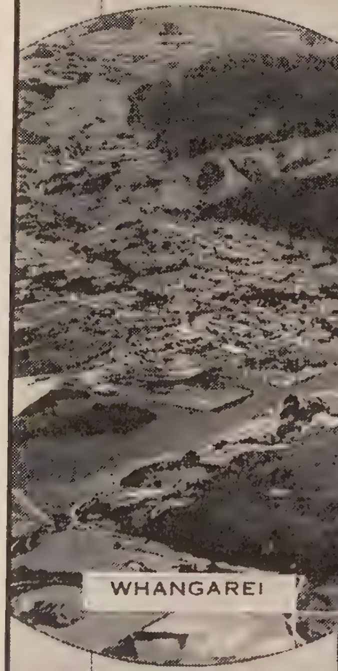
Iron Deficiency in Pigs

Apart from bacterial infections such as suipestifer, from which losses may occur, especially from weaning onward, young pigs usually fare very well. A severe anaemia, resulting in scouring and death if untreated, occasionally occurs in young pigs on the sow because of a deficiency of iron in the sow's milk. This deficiency can be overcome by supplying iron directly or applying an iron preparation to the sow's teats.

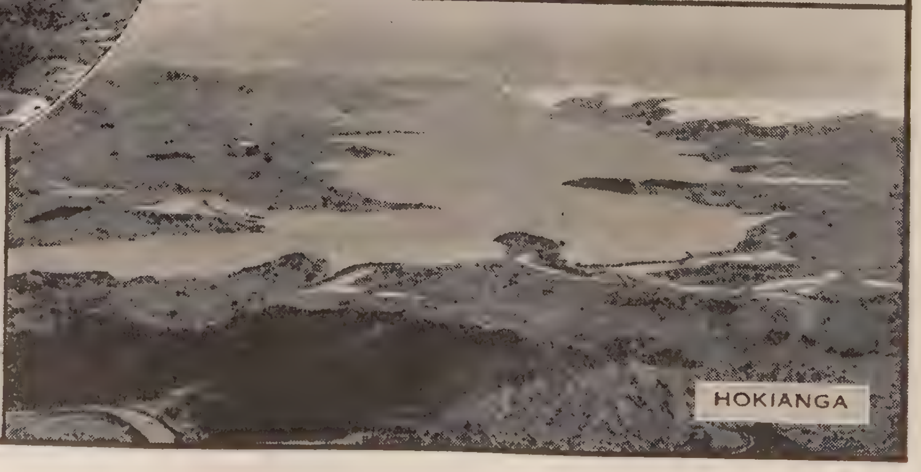
THE HARBOURS OF NORTH AUCKLAND


RUSSELL


OPUA


WHANGAREI

As water transport was the only means available to the early settlers, the first settlements sprang up near the harbours and tidal inlets. Even now the harbours of both coasts of the peninsula carry much coastal traffic, and Opua is a deep-sea port where large ships can load refrigerated cargo for overseas.


HOKIANGA

[Photographs of Russell, Whangarei, and Hokianga by V. C. Browne.

FARMING IN NEW ZEALAND

North Auckland Peninsula

THE characteristics and production of each farming district of the North Auckland peninsula—the far north, the middle north, the lower north, and Northern Wairoa—are examined county by county in this, the second section of an article by E. B. Glanville, Assistant Fields Superintendent, Auckland. The first part, published last month, gave a general survey of the history and development of the district. The concluding section next month will discuss farming trends, the part played by small holdings, the effect of the unsuccessful development schemes which have afflicted the peninsula, and the possibilities of its future.

THE 6000 square miles of New Zealand lying north of Auckland contain nine counties, and for the purposes of this survey the area is divided into four farming districts.

The Far North

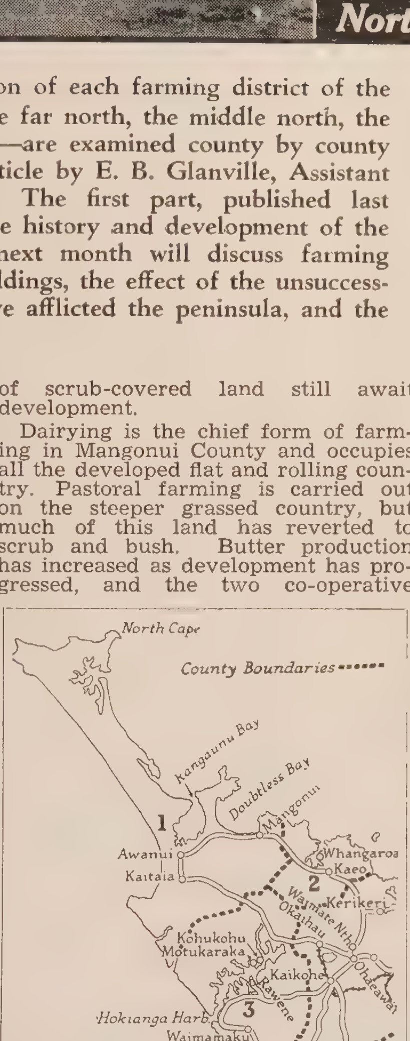
The total area occupied in the three counties of the far north, Mangonui, Hokianga, and Whangaroa, is 619,840 acres, of which 316,938 acres have been sown to grass. A total of 112,136 cattle is carried, of which 48.549 are milking cows; sheep number 172,102.

Mangonui County

Mangonui County is the most northern and is the fourth largest county in the peninsula, with Kaitaia as the chief town. Of the 304,426 acres occupied 119,948 acres have been sown to grass, and 9.4 per cent. of the peninsula's dairy cows are milked in this county. Transport by water was relied on for many years and the county is served by several small harbours, of which Awanui and Mangonui are the most important. Though roading has been improved considerably, water transport is still used extensively for the carriage of fertilisers and heavy produce to and from Auckland. Fat stock are now mostly conveyed by motor-lorry to Moerewa works.

Soil types in the county are limestone hills, brown and red-brown crumbly clay hills, swamp land, sandy peat, and a considerable area of consolidated sandy loam soil near the west coast. Areas of gumland are dotted here and there, and fairly-large areas of scrub-covered land still await development.

Dairying is the chief form of farming in Mangonui County and occupies all the developed flat and rolling country. Pastoral farming is carried out on the steeper grassed country, but much of this land has reverted to scrub and bush. Butter production has increased as development has progressed, and the two co-operative dairy factories in the county, at Awanui and Oruru, have increased their output of export butter from 976 tons in 1927 to more than 2500 tons last season.



The counties of the far north: 1 Mangonui, 2 Whangaroa, 3 Hokianga.

Hokianga County

Hokianga County, the seventh largest in the peninsula, is divided by Hokianga Harbour, Kohukohu being the chief town in the northern portion and Rawene in the southern. The area occupied is 237,745 acres, of which 165,760 acres have been sown to grass, and 8.5 per cent. of the dairy cows in the peninsula are milked in this county. More than half the sheep run in the three far north counties are in Hokianga County—91,743.

The country is much steeper and more rugged than that of Mangonui County, with many areas still to be developed, so more sheep and cattle are grazed and fewer cows are milked, though much of the county is suitable for dairying. Two co-operative dairy factories serve the district, a butter factory at Motukaraka and a small cheese factory at Waimamaku. Exported dairy products from this county have increased during the past 20 years, but while butter production rose from 664 tons in 1927 to more than 1260 tons in 1947, the manufacture of cheese increased only from 107 tons to 170 tons.

Whangaroa County

Whangaroa County is the smallest in the peninsula and the chief town is Kaeo, 23 miles from the North Auckland railhead at Okaihau. Occupied land totals 77,669 acres, of which 31,230 have been sown to grass, and only 1.7 per cent. of the dairy cows in the peninsula are milked there. The county is served by the beautiful Whangaroa Harbour and contains some very fertile valleys and reclaimed tidal flats, from which most of the dairy production comes. Much of the grazing country is steep and poor, and many fairly-large areas of scrub-covered land are undeveloped. One co-operative dairy factory, at Kaeo, operates in this small county and in 1947 produced 566 tons of butter for export, as against 230 tons in 1927.

Cropping and Supplementary Feed

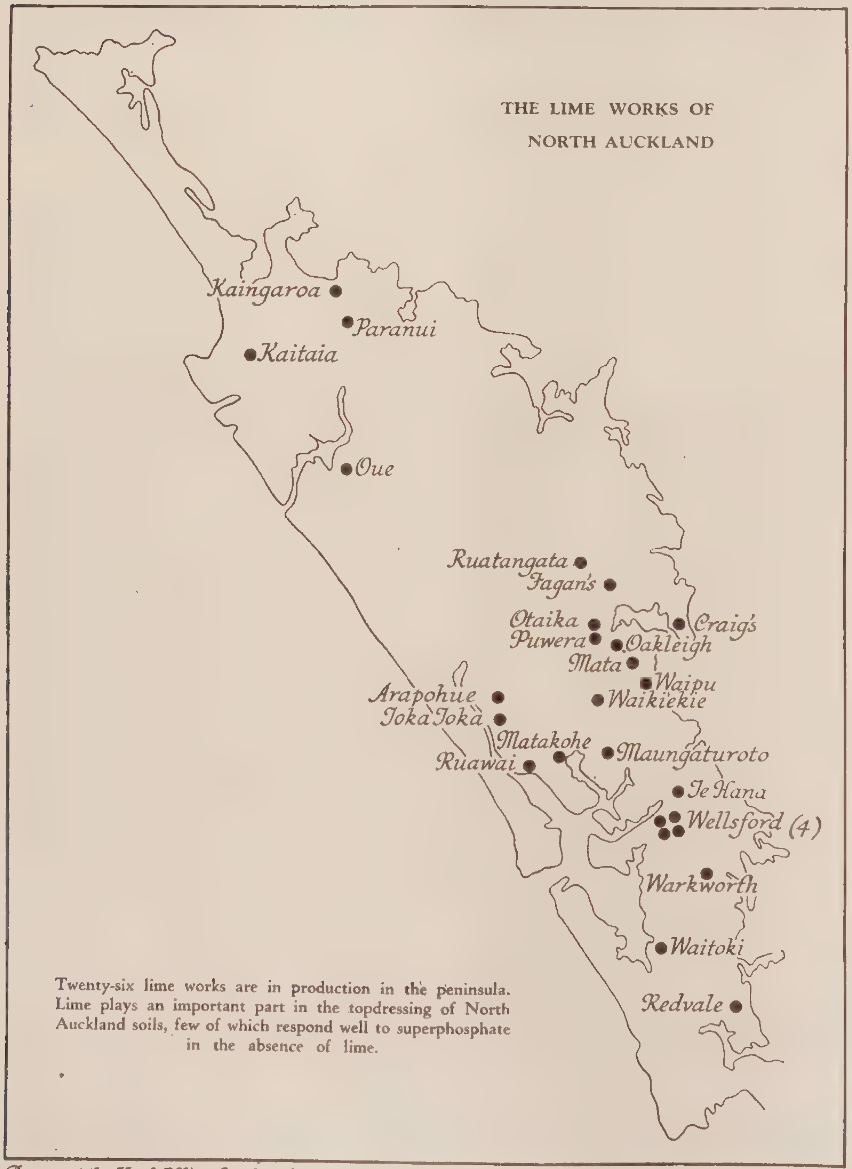
Because of the lack of suitable areas, little cropping is practised in these three counties. A few small crops of turnips and swedes are grown, in all amounting to only 123 acres. The paspalum-dominant pastures grow prolifically in the far north, and surplus growth from these pastures during the late spring and early summer is mown and saved, mostly in the form of hay, for winter supplementary feed. A total area of 3235 acres of surplus pasture growth is mown in the three counties for supplementary feed, and considerable areas of rank pasture growth are usually carried over for winter grazing for cattle. Only 25 acres of surplus pasture growth is cut for silage.

The quantity of supplementary feed saved is insufficient to bring all the cattle through the winter in good condition, and much of the hay is of inferior quality.

Lime and Fertiliser

The soils in these counties give a good response to lime and phosphate, and production from pastures depends on fairly-liberal annual dressings. Good supplies of lime are available in Mangonui and Hokianga Counties, where quarries have been opened at Kaitaia, Paranui, and Oue. Lime requirements in Whangaroa County are usually obtained from quarries further south in the peninsula, being railed to Okaihau and transported from there to farms by motor-lorry.

Phosphatic fertilisers have to be transported to these counties by sea and rail and then often long distances by motor-lorry from the ports or railhead to the farms. The difficulties of transporting fertiliser over bad roads have made the cost on the farm very high, and it is remarkable how development work has progressed in spite of this problem. Roading has been improved gradually and now practically all settlements have access by metal roads.



THE LIME WORKS OF NORTH AUCKLAND

Twenty-six lime works are in production in the peninsula. Lime plays an important part in the topdressing of North Auckland soils, few of which respond well to superphosphate in the absence of lime.

Drawn at the Head Office, Lands & Survey Dept., Wgton. N.Z.

The Middle North

In the two counties of the middle north, Bay of Islands and Whangarei, the area occupied is 855,752 acres, and 491,640 acres have been sown to grass; 194,738 cattle are carried, of which 79,791 are milking cows, and sheep total 255,494.

Bay of Islands County

The third largest in the peninsula, Bay of Islands County is served by rail and water transport. It has 328,920 acres of occupied land, of which 165,009 acres have been sown to grass. The milking cows in the county form 9.3 per cent. of the total for the peninsula, and sheep carried number 102,798. Kaikohe is the largest town, situated practically in the centre of the widest portion of the peninsula.

It was in the Bay of Islands that the pakeha made his first attempts at farming. At Kerikeri on May 3, 1820, the first agricultural plough, drawn by bullocks, was put into New Zealand soil by the Rev. John Butler, who was in charge of a mission station established there in 1819. At Waimate North the missionaries erected the first flour mill in New Zealand, which was near a stream and driven by water power. The old building still stands, and part of the waterwheel and driving cogs, which were hewn from puriri timber, are still in position.

The land in the county ranges from rich volcanic soils at Waimate North, Pakaraka, and near Kaikohe and Ohaeawai townships, and high-producing alluvial flats and valleys, to poor, undeveloped, scrub-covered, leached clay hills and gumland soils. About 64 square miles of ironstone soil presents difficulties for development.

One of the most picturesque and productive farming centres in the county is the Waimate North settlement, where dairying and cattle and sheep raising are practised. The soil of this area, which covers about 3000 acres, is of volcanic origin and is known as the Waimate clay soil type. It has developed on the rolling surface of the older basalts under cover of mixed bush containing puriri and taraire. It is a deep, friable, well-drained, reddish-brown soil.

An area of about 4800 acres of volcanic land near Kaikohe, and known as the Kaikohe clay loam, has been developed from the younger basalt flows. More fertile than the Waimate clay soil type, it is a brown, free, crumbly, clay loam with a duller brown, more compact subsoil. Though considerable fattening is done on this area, it is mainly used for dairying.

Large areas of undeveloped rolling to steep land have soils which are extremely acid and deficient in plant foods.

Production of dairy products and meat increased considerably during the past 20 years. Two co-operative

[*F. H. Hildreth photo.*

Kaitaia (Mangonui County), the principal town of the far north.

dairy factories, at Kaikohe and Moerewa, produced 1400 tons of butter in the 1947 season, compared with 455 tons in 1927. The only meat works in the peninsula is in this county, at Moerewa, where it is served by rail to Auckland and Opua, the deep-sea port where large ships can load refrigerated cargo for overseas.

In recent years citrus fruits have been grown on a commercial basis at Kerikeri. The area on which this industry has developed is roughly a rectangular tract about five miles long and one and a half miles wide between the Puketotara River and the Kerikeri Inlet. It is bound on the north, south, and east by rolling, scrub-covered hills and on the west by the large area of scrub-covered ironstone soil.

The Kerikeri area is rolling, with broad, flat-topped spurs, the sides of which descend steeply toward deeply-entrenched streams. The best citrus orchards are situated on these spurs, with their well-drained soils and gentle contours. The soil has not a very high moisture-holding capacity and in dry seasons the production of fruit is adversely affected; because of that, many of the original orchards have been grassed and turned into dairy farms.

A curing establishment for lemons has been erected at Kerikeri and 10,000 to 12,000 bushels are cured and sent away annually. In addition to lemons, 20,000 to 30,000 bushels of sweet oranges and 5000 bushels of New Zealand grapefruit are produced annually. Other sub-tropical fruits, such as tree tomatoes, passion fruit, and mandarins, are grown for commercial purposes.

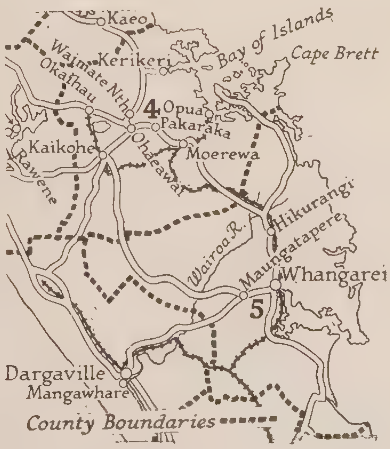
The climate at Kerikeri, with a rainfall of between 50 and 60in., is suitable for the growing of citrus fruits, but it becomes tricky in seasons when summer droughts are experienced, and as slight frosts occur in the winter, sub-tropical fruits require adequate shelter.

Whangarei County

Whangarei County is the largest in the peninsula. Occupied land totals 526,832 acres, of which 326,631 acres have been sown to grass. This county is very productive, carrying 23.2 per cent. of the total milking cows in the peninsula and 152,696 sheep. The chief town, and the most important centre in North Auckland, is Whangarei, which is on the Hatea River, a tidal arm of Whangarei Harbour, one of the largest harbours on the east coast. Whangarei is served by rail and water from Auckland, and the district is well roaded.

Though there is a considerable area of hill country in the county, none of it is exceptionally steep. The county contains a great deal of high-producing, flat, alluvial land and rolling volcanic country, and much developed gumland assists materially in maintaining production. A few peat areas are being farmed, as well as isolated patches of limestone country.

Dairy farming is widely practised and three co-operative dairy factories are convenient to the main dairying districts—at Whangarei, Maungatapere, and Hikurangi. With improved farming methods, production of butter from the three factories has risen from 2758 tons in 1927 to more than 5600 tons in 1947. Pastoral farming is also carried out extensively on the hill country, and the production of meat and wool has also shown a large increase during the past few years.



The counties of the middle north: 4 Bay of Islands, 5 Whangarei.

Cropping and Supplementary Feed

Much more cropping for supplementary feed is carried out in these two counties than in the three northern counties and much more hay and silage is saved from surplus pasture growth. A total of 1997 acres is sown in crops such as swedes, turnips, rape, and chou moellier, and a little maize is grown for pig feed. The area of surplus pasture cut for hay amounts to 14,533 acres and that cut for silage to 732 acres. The better provision of supplementary feed for stock in these two counties in some measure is the result of more land being suitable for cropping throughout the area, and also because there is more pasture land which can be mown easily. Some excellent pastures have been established in the middle north on the more fertile alluvial flat, volcanic, and limestone soils. These areas produce the bulk of the dairy produce and on them many of the fat cattle and sheep are topped off.

Lime and Fertiliser

The soils generally are very acid and respond well to lime and phosphate. The middle north is reasonably well supplied with lime works, but much more lime could be used to advantage throughout the area. Phosphate supplies, which are essential to maintain the fertility of North Auckland soils, were reduced considerably during the war, which caused some deterioration in the pasture swards on many farms.

The Lower North

The lower north (Otamatea, Rodney, and Waitemata Counties) contains a total occupied area of 706,727 acres, of which 459,744 acres have been sown to grass. Cattle carried total 179,532, of which 84,040 are milking cows, and sheep number 363,513.

Otamatea County

Otamatea County is the second smallest in the peninsula, and the north-west portion is included in the Northern Wairoa farming district. It is one of the highest producing areas in proportion to its size and of 215,920 acres of occupied land 156,267 are sown to grass. Dairy cows in this county amount to 11.6 per cent. of the total for the peninsula and 105,784 sheep are

TOMOANA
PIG PELLETS

the IDEAL food for
SOWS!

For further information write to—
W. & R. FLETCHER (N.Z.) LTD.,
BOX 663. WELLINGTON. J.9

For Better Returns of

WOOL, MEAT, and
DAIRY PRODUCE

Next Season . . . Start Now
with

K.P. RGD. T.M.

HIGH-GRADE
FERTILISERS

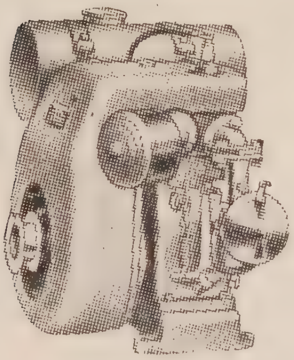
KEMPTHORNE, PROSSER & Co.'s NEW ZEALAND
DRUG COMPANY LIMITED

Auckland — Wanganui — Christchurch — Dunedin

RELIABILITY . . .
ECONOMY . . .
EFFICIENCY . . .

Villiers

4-STROKE ENGINES



Built in the largest factory in the world making light-weight engines, VILLIERS are unsurpassed in performance—and the 50 year reputation of reliability is your guarantee that the best buy is undoubtedly VILLIERS.

Obtainable in 1 h.p., 2 h.p.
and 2½ h.p. Models.

Factory Representatives:
F. W. CAVE LIMITED
P.O. Box 1685 - AUCKLAND
VE.3

DEVELOPING
PROSPERITY!

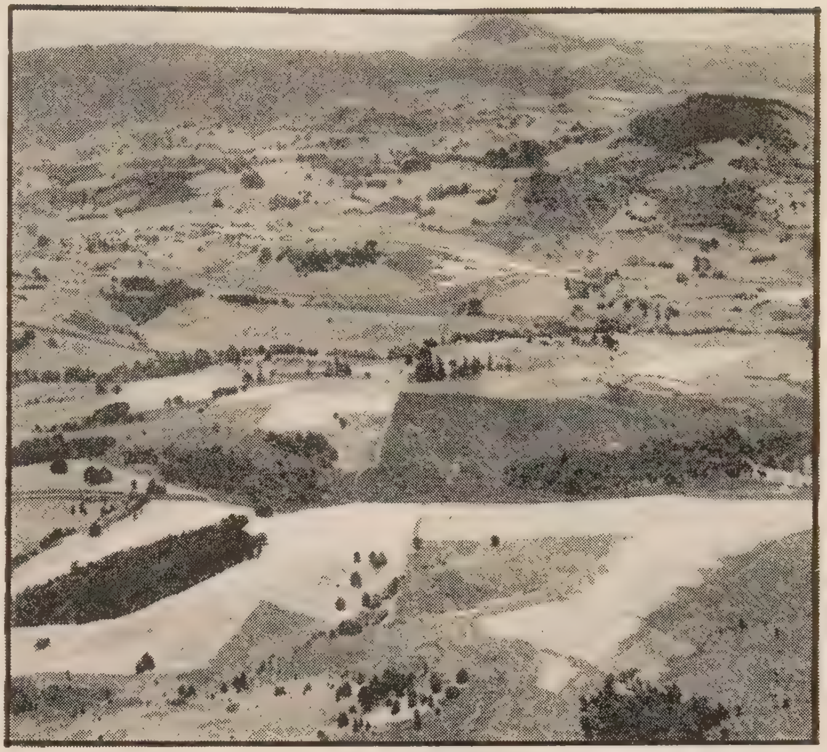
Construction speeds progress, brings better living, easier travelling, increased primary production. Throughout New Zealand, ALLIS-CHALMERS Power equipment is setting new economy records in the construction of roads, airports, subdivisions, on farms, in industry, on any grading project where earth must be moved quickly at low cost. Prompt after-sale service guarantees owners maximum work life with the minimum of overhauls.

ALLIS-CHALMERS
North Island Distributors: THE DOMINION MOTORS LTD.
Head Office: Courtenay Place, Wellington.
Dealers in all Main Centres.

carried. The largest township is Maungaturoto, which is in the centre of a fertile farming area.

Most of the fertile alluvial flat land borders the Northern Wairoa River, which is included in the Northern Wairoa farming district, and the topography of the remaining portion is mostly rolling to hilly, with no very steep hills. The soils vary, but in the main they are derived from sandstone and claystone, while this county is fortunate in having a large area of fertile, rolling, limestone country. Much of the limestone country is badly watered and lies very wet during the winter months. Gumland areas are located through the county, and near the east coast is a considerable tract of sandy gumland.

Otamatea County is a very productive area, the flat and rolling country being used for dairy farming while sheep and cattle graze the steeper and less accessible areas. During the past 20 years production of butter from the Maungaturoto co-operative dairy factory has increased from 351 tons to more than 1600 tons. Some of this increased output is the result of extra supplies to the factory from the Waipu area since the 1941-42 season, when the Waipu factory was destroyed by fire. The number of sheep and cattle has also increased, giving a greater production of meat and wool.

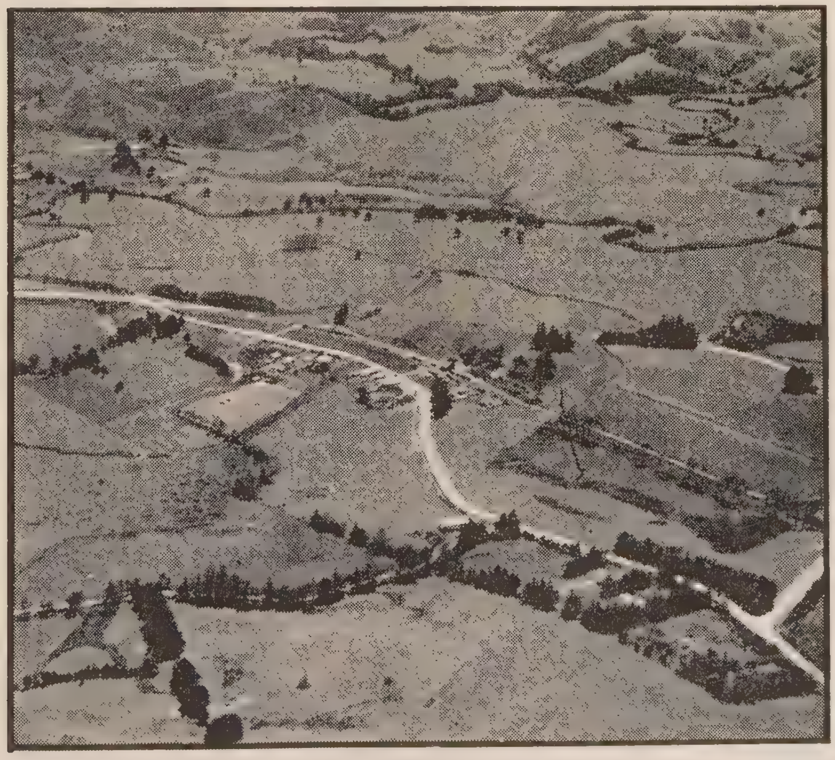


[V. C. Browne photo.

Kamo, near Whangarei, set in typical North Auckland farming country.

Rodney County

In Rodney County, the fifth largest in the peninsula, occupied land totals 247,941 acres, of which 173,453 acres have been sown to grass. The dairy cows carried represent 9.9 per cent. of the total for the peninsula, and sheep number 148,560. The chief town in the county is Warkworth, and Wellsford, a township 13 miles north of Warkworth and in the centre of a tract of good farming land, has made rapid growth during the past few years.



[V. C. Browne photo.

Whakapara, in the middle north on the main railway line north of Whangarei.

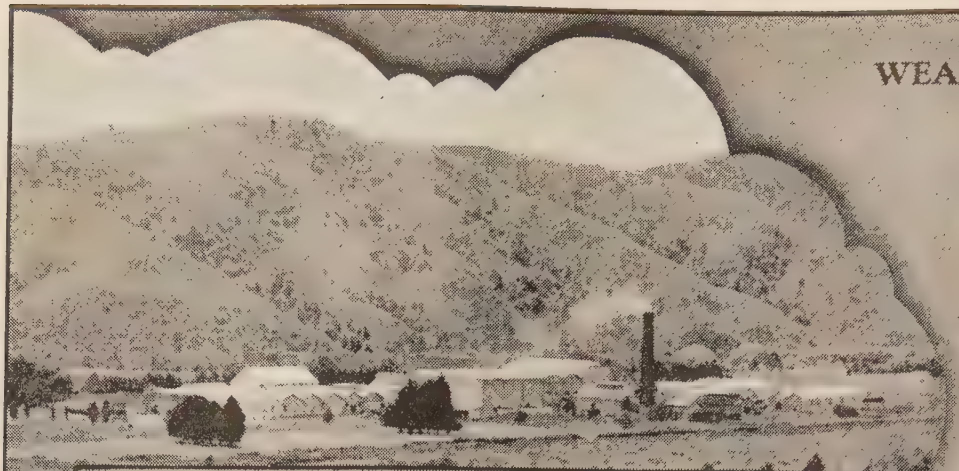
The topography of the county generally is hilly, with fertile valleys, the hills rising steeply in places up to 1000ft. The soil types vary and are mostly of low natural fertility. At Tara, near Mangawai, adjacent to the sea coast at the north-east end of the county, is a very rich, fertile, volcanic cone of some 2000 acres surrounded by a considerable tract of poor, sandy, gumland soil. Much of the land to the north of Wellsford is gumland, and the development of this land, because of its better topography, has progressed during recent years.

Because of the nature of the country, more pastoral farming is practised in this county than in Otamatea County, but dairy farming is intensive on the areas suited to it. Three co-operative dairy factories, at Te Hana, Warkworth, and Matakana, manufacture butter.

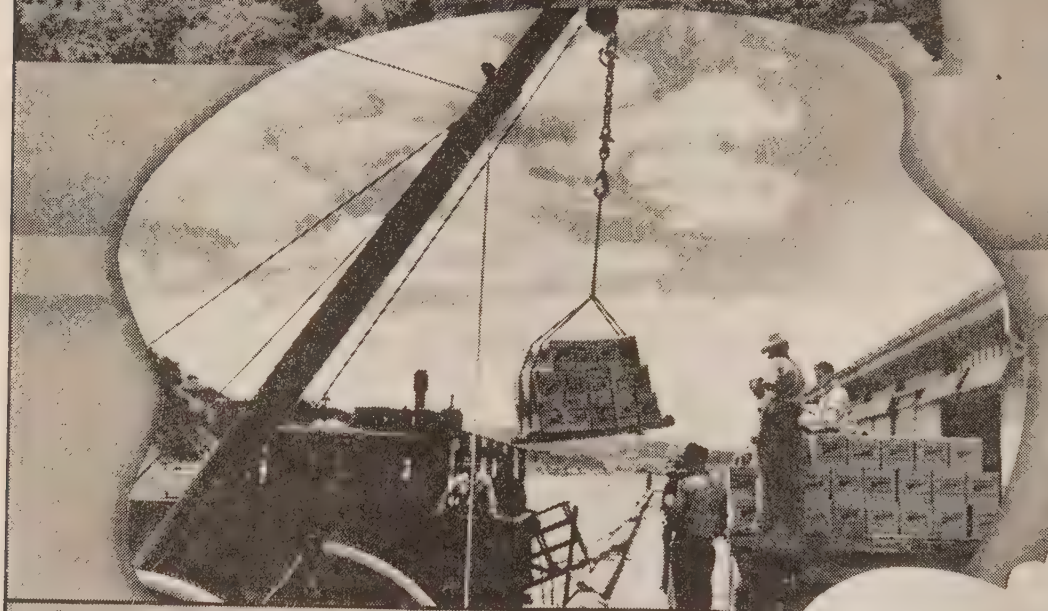
The production of meat and wool from the pastoral farms in Rodney County is one of the highest in the peninsula in proportion to its size, and some of the primest beef grown in the north comes off the good limestone grazing country near the Wellsford district.

In the past fruit growing was popular in certain districts, but as dairying has progressed the area in orchards has decreased to about 175 acres. The

WEALTH FROM THE LAND



MOEREWA, NORTH AUCKLAND'S ONLY MEAT WORKS



LOADING NORTH AUCKLAND BUTTER FOR EXPORT

Prolific grass growth, sponsored by a favourable climate and the response to lime and phosphates, makes the North Auckland peninsula an ideal area for the production of primary produce, particularly butter, of which 53,000,000lb. was produced for export in the 1946-47 dairying season.

ONE OF THE PENINSULA'S 17 CO-OPERATIVE BUTTER FACTORIES

[Centre and lower photographs by National Publicity Studios.

Warkworth, principal town of Rodney County, in the lower north.

orchards still existing produce mainly apples, pears, and peaches. They are located at Te Hana, Port Albert, Matakana, and Warkworth.

Waitemata County

The sixth largest in the peninsula, Waitemata County, contains 242,866 acres of occupied land, of which 130,024 acres have been grassed; 12.6 per cent. of the total dairy cows in the peninsula are milked and 109,169 sheep are carried. Helensville is the main town. The topography ranges from good alluvial flats to hilly country, of which there is a great deal at the northern end and in the centre. There are numerous valleys and flats and a considerable area of rolling country.

The soils vary greatly as in other northern counties, but in the main they consist of heavy clays in different stages of fertility. A strip of sand country in varying stages of consolidation runs from South Head along the west coast to opposite Kumeu. The consolidated sands have formed a sandy loam which is readily developed into highly-productive grassland by the application of phosphate. Soils overlying a limestone formation are also found in the county, but they lie very wet during the winter.

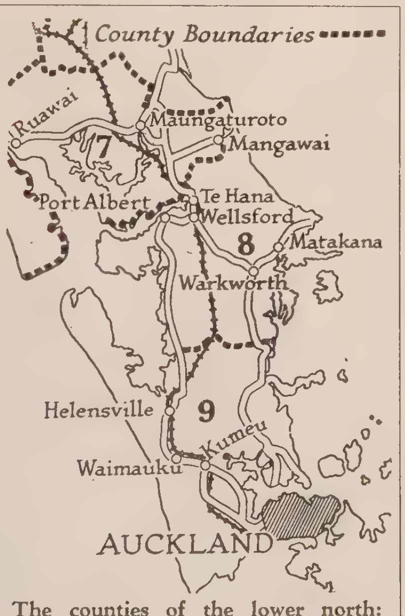
In past years sawmilling was the main industry but more recently farming has developed rapidly—dairy farming on the flat and easy undulating country, sheep and cattle farming on the steeper land. In the southern portion, near Auckland City, the farms are smaller. Some supply whole milk to the city, and many small holdings produce fruit and vegetables for the city markets. The production of fruit and vegetables is greater in Waitemata County than in any other in North Auckland, because of its close proximity to the city; more than 2000 acres are in orchards and more than 300 acres in market gardens.

As in other northern counties, dairying is the chief type of farming, but a large portion of the county is devoted to pastoral farming and the production of meat and wood is also important. There are two co-operative dairy factories, at Helensville and Waimauku, and the production of butter has increased from 1666 tons to more than 2600 tons in the past 20 years.

Cropping and Supplementary Feed

Cropping and the saving of surplus grass growth as hay and silage for supplementary feed are practised by farmers of the lower north area on a similar basis to the farmers in the middle north. An area of 2097 acres is cropped with supplementary feed crops such as swedes, turnips, rape, and chou moellier; 14,472 acres of surplus grass are cut for hay and 881 acres for silage. The provision of this supplementary feed no doubt has been a factor in the increased production of primary products during recent years.

The soils of the lower north require similar fertilising to the more northern ones. Except on the sand soil of the east, lime is essential, especially on the poor, leached clays, and the area is well supplied with lime works. The shortage of phosphate during the war is beginning to show its effect on many pastures on the poorer soil types. The lower north came into prominence during the war with the introduction of the new fertiliser serpentine superphosphate, because it was in this area that the outcrops of serpentine were found and quarried.



The counties of the lower north: 7 Otamatea, 8 Rodney, 9 Waitemata.

With the return of normal supplies of phosphate and the use of more lime, existing areas of pasture land in the lower north will give still higher production, and further undeveloped areas can be made productive. The climate is ideal for good pasture growth, but for best results it is necessary to build up the fertility of the soils by topdressing adequately and regularly.

Northern Wairoa

More than 500,000 acres in extent, the Northern Wairoa district takes in Hobson County, the second largest in the peninsula (about 450,000 acres), and the north-west portion of Otamatea County, known as the Ruawai Flats, which lie near the Northern Wairoa River. Land occupied in Hobson County totals 354,638 acres, of which 188,922 acres have been sown to grass. Cows milked in the county represent 13.3 per cent. of the peninsula's total, and 119,740 sheep are carried. The Ruawai Flats stretch up the Northern Wairoa River for almost eight miles and are about four miles wide.

The main town in the area is Dargaville, the second largest town in North Auckland; it is on the western bank of the Northern Wairoa River, about 40 miles from the river's entrance to Kaipara Harbour. The district gets its name from the Northern Wairoa River, which is about 95 miles long and the largest river navigable by ocean-going steamers in the Dominion. The river rises in the hilly land of

TOMOANA

PIG PORRIDGE

Emulsified

Food-fats with

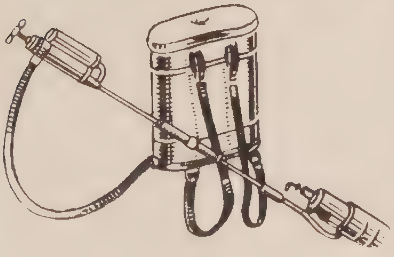
VITAMINS

For further information write to—

W. & R. FLETCHER (N.Z.) LTD.
BOX 663, WELLINGTON. J.11

Employ the Proved WEED Destroyer

THE BEST BURNER

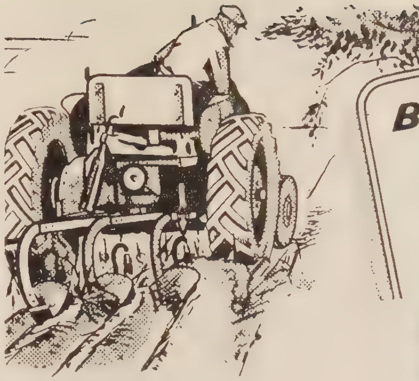


Weighs 28lbs. loaded for 4 Hours' Work. Burning costs 6d. per hour. A GAS Flame—Not an Oil Flame. IT IS NOT A FLAME THROWER. Saves Time and Labour in Eradicating Gorse, Rushes, Blackberry, etc., Sterilising Poultry Houses, Burning off Drain Sides and Water Races.

OBTAIN FULL PARTICULARS AND FREE PAMPHLET FROM

The BEST BURNER Ltd.

46 Tuam Street - Christchurch.
P.O. Box 291. Phone 33-851



BUILT FOR HARD WORK!

DAVID BROWN

Cropmaster TRACTOR

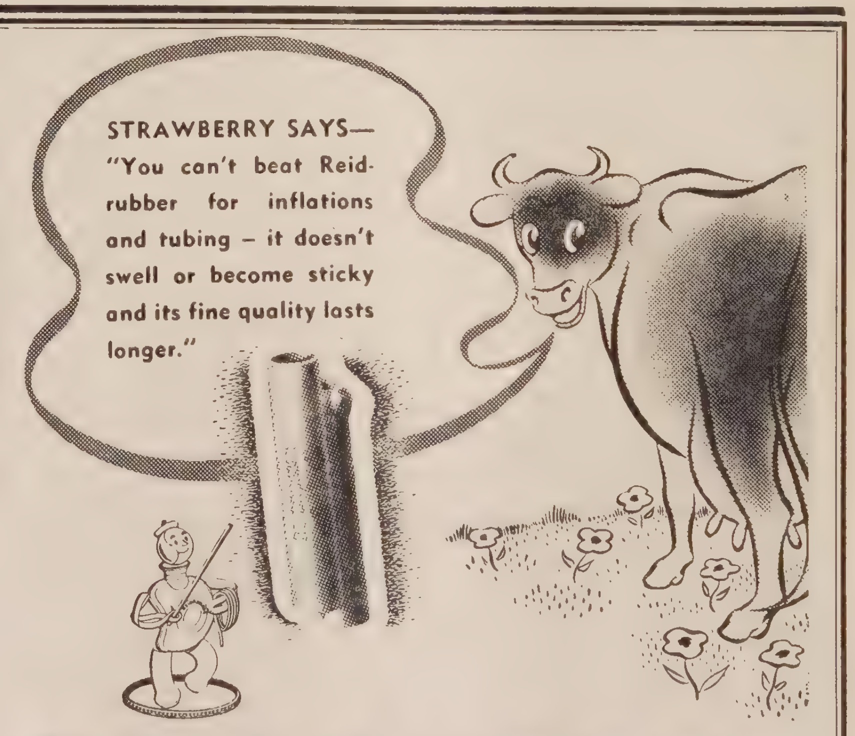
On New Zealand farms the all-British David Brown "Cropmaster" is proving its outstanding capabilities. Here's the tractor that has become world-famous for its practical, advanced features such as hydraulic lift, overload clutch release, width control, adjustable track, direct-attached implements, etc. All implement controls—hydraulic lift, width, level, pitch, depth—operated from driver's seat.

Full details available from your local David Brown dealer.

N.Z. Distributors for "David Brown":

TODD BROS. LTD.,
TODD BUILDING, COURTENAY PLACE,
WELLINGTON.
DEALERS EVERYWHERE.

"Power-Controlled Farming"


STRAWBERRY SAYS—
"You can't beat Reidrubber for inflations and tubing – it doesn't swell or become sticky and its fine quality lasts longer."

REIDRUBBER

REID NEW ZEALAND RUBBER MILLS LTD., GREAT SOUTH ROAD, AUCKLAND.

the peninsula and flows south till it enters Kaipara Harbour. It is navigable for more than 70 miles and ships of up to 2500 tons are able to travel up the river as far as Dargaville.

Topography and Soils

The topography of the area ranges from the central river flats to hill country to the east and north. There are no exceptionally-steep, high hills.

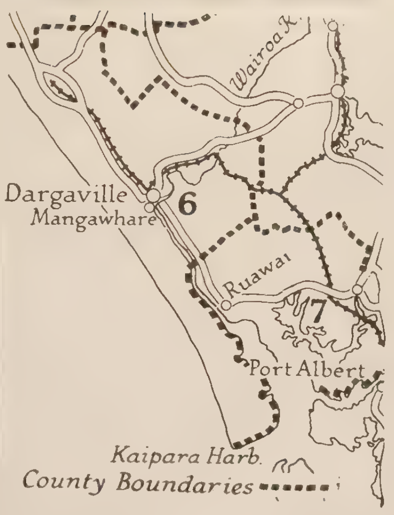
The hill country consists of soils derived from sandstone, claystone, and limestone. Along the coast to the north the soils are of volcanic origin, and south of this, near the sea coast and stretching for some miles, is a strip of recent, very high-producing, consolidated sand country. Just inside this fertile strip is a very large tract of sandy gumland of poor fertility.

The soils of the river flats vary from alluvial heavy clay loams to more recent river alluvials. Those at the foot of volcanic hills or derived from washings from limestone hills are of high fertility, but those formed from the washings of claystone and sandstone hills are much inferior. A large area of the flats has been built up by the fine, silty material deposited by the river. The hill-country soils range from sandy loams and sandy gumlands in the west and south to sandy clay loams and heavy clay gumlands in the east; in the northern portion of the area are poor, complex soils of volcanic origin.

Drainage is the chief soil problem on the flats. The soils have a heavy texture, making them difficult to drain, and during the winter they poach badly, even with light stocking. The production of grass on these flats is exceptionally high; on areas properly drained some farms carry a cow to the acre.

Production

The district is served by two co-operative dairy factories, one (the Northern Wairoa) at Mangawhare, near Dargaville, and the other at Ruawai. Production of butter has increased from 2394 tons to more than 5000 tons during the past 20 years. The Northern Wairoa factory is the largest in the peninsula and its annual production of butter exceeds 3500 tons. Pastoral farming is practised on the hill country and considerable fattening is done on the flats, but dairy farming is the district's main type.



The counties of the Northern Wairoa: 6 Hobson, 7 Otamatea.

In the past the timber industry was of great magnitude in the Northern Wairoa and large quantities of kauri and white pine timber were felled and milled. This industry is still of importance, but good kauri timber is now more difficult to get because of the scarcity of suitable trees and the inaccessibility of the few remaining kauri forests. Great quantities of kauri gum have been obtained from the district, especially between the river and the sea coast, where kauri trees once grew in abundance.

Very little cropping is done in the Northern Wairoa considering the size of the district. Only 697 acres are cropped with supplementary feed crops such as swedes, turnips, rape, and chou moellier; 3900 acres of surplus pasture growth are mown for hay and only 103 acres cut for silage. The small amount of cropping is the result of the difficulty of cultivating the heavy clay soils, and therefore hay is relied on for winter feed. Many of the dairy stock milked on the flats are wintered on adjacent hill country. The winter feeding of the stock has improved considerably in recent years, but much more could be done to bring stock through the winter in better condition.

Lime and Fertiliser

Topdressing in the Northern Wairoa is most important to keep pastures producing well. Lime and phosphatic fertilisers are necessary to keep up the fertility of the soil, and it is remarkable how production was maintained during the war with the small amount of fertiliser available for topdressing.

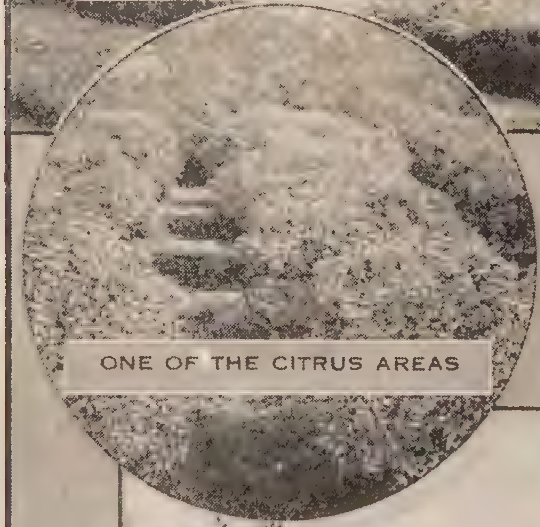
The district is fairly well served by local lime works, which could be extended with advantage, as large quantities of lime are required on the flats and it is also necessary on the other soil types in the area.

The Northern Wairoa district has a great future, and with the use of more lime and fertiliser, the provision of more winter feed, and better drainage, the quantity of dairy and meat products will increase further.

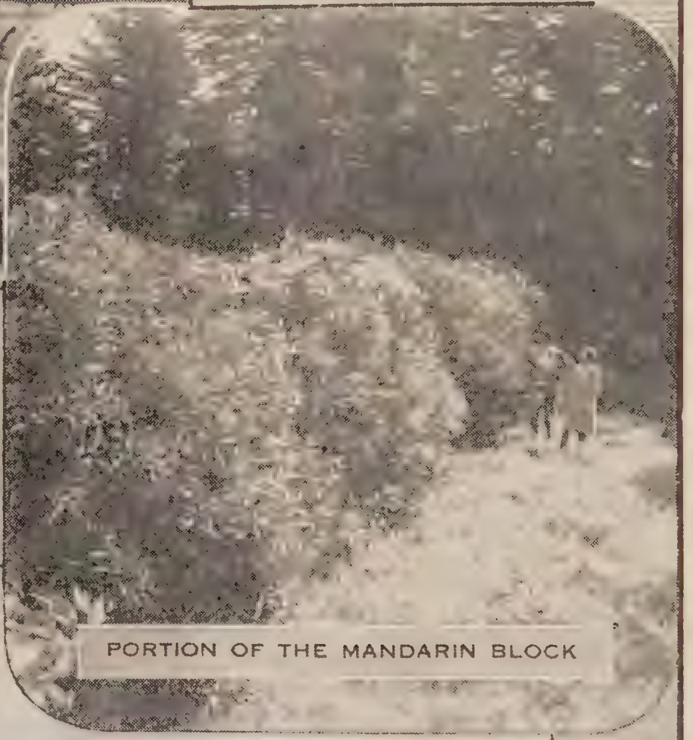
Portion of the Turiwiri Flats, near Dargaville, in the Northern Wairoa district.

A SMALL HOLDING OF SUB-TROPICAL FRUITS

THE GRAPEHOUSE AND GOLDEN EUONYMUS HEDGE



ONE OF THE CITRUS AREAS



PORTION OF THE MANDARIN BLOCK

A CORNER OF THE HOUSE, WITH PORTION OF THE GOLDEN EUONYMUS SHELTER ON THE RIGHT

A Small Holding of Sub-tropical Fruits

PROBABLE financial returns from plantings of various sub-tropical fruits are the subject of frequent inquiries, and, while much information on cultural methods can be given, very little is available about the financial aspect. In any case, it would be unwise to attempt to prophesy future trends in either costs of production or market returns. However, some light is thrown on the subject in this account by A. T. J. Watts, Orchard Instructor, Auckland, of what has been done on an eight-acre holding on the Avondale flat.

One of the rows of lemon trees. Between 1941 and 1946 the average annual production of lemons was 426 bushel cases.

THE Avondale flat, about six miles west of the centre of Auckland City, contains an area of about 1300 acres, bounded on the north and east by Waitemata Harbour and on the west by the Whau Estuary. In the main the land is flat and the soil of a rich alluvial type. It is the oldest vegetable-producing area in the Auckland district and is well known for its high production to the acre. Though the area is subject to slight to moderate frosts, sub-tropical fruits such as citrus fruits, tree tomatoes, and passion fruit are being grown successfully in various parts. In recent years the locality has become more closely settled, and the area under cultivation is contracting steadily.

At present 39 commercial gardeners are established in the area, with a total of 390 acres in vegetables. A further 162 acres are in pip, stone, and citrus fruit, there being 36 orchards ranging in size from one to ten acres, aggregating 128 acres, and 70 smaller orchards with a total area of 34 acres. In addition there are considerable areas in sub-tropical fruits, as well as nine registered nurseries, raising mainly fruit trees.

A good example of the type of fruit growing in this district is provided by the area owned until recently by Mr. J. Strang. After returning from the First World War, Mr. Strang had two and a half years' experience of orchard work in the Mangere district, and in 1922 bought eight acres at Avondale, half of which was already planted in New Zealand grapefruit, lemons, passion fruit, persimmons, and plums. Most of those were just coming into bearing but were insufficient to provide a full living. In the unplanted area Mr. Strang grew vegetables, mainly cabbages, kumaras, potatoes, and tomatoes, and as opportunity offered he increased the permanent crops by the addition of mandarins, Chinese gooseberries, tree tomatoes, grapes, and 100 more lemon trees. Planting of the whole area was completed in 1938. Orchard equipment was also gradually built up and the orchard piped for spraying.

The cultivation implements consist of a 10-horsepower tractor with, as attachments, a set of discs, a plough, harrows, and a scarifier. An electric motor drives the single-cylinder spray pump. The normal cultivation programme has been one ploughing (about September), discing twice (in October), and scarifying once a fortnight until the end of December, when weed growth was allowed to come away, to be disced under in the following spring.

Layout of Orchard

A feature of the orchard is the excellent shelter. The area is protected on the south-west by more than an acre of native bush and on the south-east by *Pittosporum crassifolium* and wattle; the northern boundary also carries *Pittosporum*, and on the north-west are macrocarpas, which are rather high for this situation, shutting out too much sun, particularly in the winter. The subdividing shelters are mainly *Pittosporum* and privet, with a particularly-good row of golden euonymus. The orchard is divided into seven blocks, so that with headlands, hedges, and bush only about five acres are under cultivation. However the shelter, in conjunction with the flatness of the land, increases the possibility of frost damage, and, in co-operation with the Department of Scientific and Industrial Research, the present occupier is experimenting with the use of firepots and a wind machine.

It is not suggested that the layout of this area is ideal. Much of the planting was carried out a good many years ago, and the grower's own experience, as well as the results of experimental work, has suggested several modifications.

As Table 1 shows, in no case is the average production per tree very high—in fact, that of some is low in comparison with the normal production of the district. Various factors contribute to this result, close planting and ageing trees being perhaps the most obvious.

Passion Fruit

The 63 chains of passion fruit (a few more than 400 vines) are in rows 12ft. apart, with 10ft. between the vines, which are supported on four wires about 15in. apart, the top wire varying from 6ft. 6in. to 7ft. from the ground. Production has been fairly steady during the past few years and, the majority of the vines being now fully grown, little increase in crop can be expected. The older vines are gradually being replaced as their production decreases.

Disease has not been troublesome, probably because of regular and efficient spraying, Bordeaux mixture being applied at three-weekly intervals from October to February. Pruning has been in line with good commercial practice, as has manuring, though possibly lighter than advisable for heavily-cropping vines.

Photographs on this and opposite pages by Sparrow Industrial Pictures Ltd.

STATISTICS OF A SMALL HOLDING OF SUB-TROPICAL FRUITS

TABLE 1: CROP PRODUCTION

Fruit	Number of trees	Unit	1941	1942	1943	1944	1945	1946	Average	Average per tree	Percentage of gross income
Passion fruit ..	63 chains	Half case	726	302	518	507	562	487	517	8.2 per chain 1.25 per vine	33.5
N.Z. grapefruit ..	90	Ton	7.75	10.0	8.0	12.5	10.25	9.0	9.6	238.5lb.	18.9
Lemons	119	Bushel case	550	437	218	419	552	379	426	3.6	11.5
Omi Kin Kan oranges	27	Ton	3.25	2.5	3.0	2.5	3.5	3	2.9	245.4lb.	6.3
Mandarins	31	Half case	2	19	9	79	32	21	27	0.9	1.5
Meyer lemons ..	37	Half case	—	—	—	7	15	43	22	0.6	0.5
Tree tomatoes ..	277	Half case	125	139	29	93	193	275	142	0.5	12.0
Grapes	30	lb.	816	766	948	866	909	804	852	28.1	6.1
Persimmons	36	Half case	274	136	314	179	139	118	193	5.4	3.9
Chinese gooseberries	29	Half case	77	32	37	68	55	34	51	1.7	3.6
Plums	41	Half case	199	176	80	278	45	132	152	3.7	1.8
Gross market returns			£949	£776	£1057	£1737	£1769	£1751	£1340		

No record has been kept of five Seville orange trees, but they contributed 0.4 per cent. of the gross income.

TABLE 2: EXPENSES (EXCLUDING OWNER'S LABOUR, INTEREST, AND DEPRECIATION)

Items	1941 £	1942 £	1943 £	1944 £	1945 £	1946 £	Average £	Percentage
Wages	97	155	166	185	187	236	171	39.8
Cases	34	29	29	55	44	34	38	8.8
Cartage	35	29	22	37	38	34	33	7.7
Rates	29	29	30	29	25	22	27	6.3
Manure	22	27	22	24	28	34	26	6.0
Tools	4	3	7	16	16	16	10	2.3
Tractor expenses ..	8	9	6	9	12	12	9	2.1
Sundries	7	8	6	10	8	10	8	1.9
Sprays	8	6	4	10	7	4	7	1.6
Seeds	—	1	6	4	3	—	2	0.5
Commission (not payable on all sales)	72	54	84	132	120	130	99	23.0
Total	316	350	382	511	488	532	430	
Market receipts ..	949	776	1057	1737	1769	1751	1340	
Return to grower (interest, depreciation, and grower's labour to be deducted) ..	633	426	675	1226	1281	1219	910	

TABLE 3: HARVESTING PERIODS

January	February	March	April	May	June	July	August	September	October	November	December
Grapes ═	═										
				═	═	Passion fruit ═	═				
				═	═	Tree Tomatoes ═	═	═			
Plums			Persimmons		═	Grapefruit ═	═	═			Plums
					═	Oranges ═	═	═			
					═	Chinese gooseberries ═	═				
						Mandarins ═	═				
							═	Lemons * ═	═		

* Lemons are harvested throughout the year, but the peak is in August, September, and October.

Citrus Trees

Some of the citrus trees are rather close together for this type of land, particularly the lemons, which are 18ft. by 18ft., and the New Zealand grapefruit, some of which are 15ft. by 15ft. and others 20ft. by 20ft.; 24ft. each way would not be too much for heavily-cropping trees.

The bulk of the crop of New Zealand grapefruit and Omi Kin Kan oranges has been sent direct to the factory, which reduces the labour and material required for packing and other work. Similarly, lemons go straight to the Marketing Department depot in field boxes, though in the early years Mr. Strang cured his own.

The mandarins (variety Clementine) are almost in full production, the 1947 crop showing a considerable advance on that of previous years. The trees show a tendency toward biennial bearing, though in two successive seasons, 1945 and 1946, the crop was small.

The Meyer lemons are younger trees but should soon be capable of carrying heavy crops.

Grapes

The 60ft. by 18ft. glasshouse is used solely for 30 Black Hamburg grape vines, which are planted in outside borders. They are run as double rods and have given consistently good crops. Cultural practices have not varied significantly from the normal.

Tree Tomatoes

The tree tomatoes, both red and yellow varieties, have been planted at various distances, all, in the light of experience, rather close. Four rows are as close as 4ft. by 2ft., one double row is 5ft. by 4ft., and five rows are 12ft. by 4ft. The most recent recommendation is to plant them 10ft. apart, "staggered" in pairs of rows 6ft. apart, with at least 14ft. between each pair of rows. Close planting has several disadvantages: The crop per tree is reduced considerably, though the greater number of trees tends to maintain the crop per acre; the fruit on crowded trees rarely attains maximum size, and picking, pruning, and spraying are made more difficult.

Mr. Strang's average crop of about half a case a tree appears low, though the 1946 crop of a case a tree would show a comparatively good production per acre. Many of the trees are nearing the end of their economic lives and will have to be replaced shortly.

Chinese Gooseberries

Chinese gooseberries are 14ft. apart in the rows and are trained on three wires, 2, 4, and 6ft. from the ground. This planting is rather close for heavy cropping. One block contains five plants, one of which is a male; the remaining 24 plants, in a block some distance away, are all females.

For pollination, sprays of male flowers are placed in water 5ft. apart along the rows of females every morning. This appears to be as efficient as where the male is growing in the row, though it is probable that an occasional male graft in the block of females would eliminate this constant attention.

[Sparrow Industrial Pictures Ltd. photo.

Vigorous growth of Chinese gooseberries.

Persimmons

Persimmons are not commonly grown but are gradually increasing in popularity. For the grower they have the disadvantage of a tendency toward biennial bearing, though that may be overcome to some extent by pruning. Little information is available about the best cultural methods for New Zealand conditions, but Mr. Strang has treated them successfully on much the same lines as the usual deciduous fruits.

Labour a Big Item

For several years Mr. Strang was able to do much of the work himself, employing casual labour when necessary, but from 1942 he employed a permanent hand. During the six years dealt with wages have been the biggest item of expenditure, averaging nearly two-fifths of the outgoings. In Table 2, showing a classification of expenses, no allowance has been made for the owner's labour, or for depreciation or interest on capital invested; at normal rates the last two items would approximate £250. Replacements of trees are not shown as a separate item of expenditure, any necessary plants being raised on the orchard.

Several points become evident from a study of the returns from this piece of land. One is the necessity for extended hours and hard and intelligently-directed work. The choice of a site is important—convenient to a market, with soil and climate suitable for the intended crops—as is the improvement of these conditions by the provision of shelter and management of the soil. Of outstanding importance is the arrangement of the crops so that as far as possible both work and returns are spread evenly through the year. Though overlapping is inevitable, preliminary planning can reduce considerably the number and intensity of rush periods. It may not be wise to depend too heavily on one crop, but a multiplicity of crops, each necessarily on a very small scale, is also undesirable. Mr. Strang could have marketed fruit every week in the year, but his highest financial returns came in the late autumn and winter. The harvesting period for most fruits varies only within narrow limits, but that for passion fruit, and to a less extent for tree tomatoes, can be extended by variations in pruning. Table 3 shows approximate maturity periods.

The keeping of accurate records of expenses, routine operations, crops, and monetary returns is neglected by many growers. That is the only method by which a grower can ascertain which are his profitable trees and which are "passengers." In many instances the culling of unprofitable trees would considerably increase the financial returns from a plantation, but in the absence of detailed figures they cannot be picked out easily.

Returns from similar plantings should be estimated on the basis of crops harvested and not prices received. The period covered, particularly 1944 to 1946, was remarkable for the high prices paid for fruit generally, and it appears unlikely that they will be maintained. In addition to the general economic trend, an increasing supply of tree tomatoes, passion fruit, and Chinese gooseberries from recent plantings in Auckland Province will tend to depress prices unless southern markets can be developed sufficiently to absorb the increase.

Thanks are expressed to Mr. Strang and the present owner for supplying information for this article.

FARM WORK FOR JULY

By the Fields Division.

WINTER-SAVED GRASS

The new milking season begins on most North Island dairy farms in July, when pastures are at their lowest ebb in growth. The careful dairy farmer has provided for this by closing as many paddocks as possible in April and May to save the late-autumn growth of grass for July. As soon as enough cows have calved, say 10 to 15 out of 50, a start can be made to use the saved grass. Two hours a day for grazing are sufficient, the milkers then being taken off for a feed of hay and roots or silage on another paddock. As soon as the first paddock of winter-saved grass is cleaned up in this way the same procedure can be repeated on the next. The aim should be to have enough winter grass to feed the milkers for five to six weeks, that is, to about the end of August, when there should be sufficient feed on some of the other paddocks to follow on.

USE OF ELECTRIC FENCE

The electric fence is being used with success in the efficient grazing of winter-saved grass. The fence is moved across the paddock on the break system in the same way as the sheep farmer moves his netting fence in feeding off breaks of root and other fodder crops. This method gives good utilisation of all the feed, but causes little fouling of the grass, as the cows are fed their ration of hay, roots, or silage on the grazed area, which increases in size as more cows come in and the fence is moved.

SPRING GRAZING MANAGEMENT

Whether winter grass has been saved or not, some systematic method of grazing pastures in rotation is necessary if the best use is to be made of the spring growth. This also helps to ensure that all the surplus growth of October and November will be available for hay and silage. If a dairy farmer shifts the milking cows to a fresh paddock each day in his anxiety to give them the best feed available, it is certain that he will be short of feed in the spring, and later he will have rough growth which the cows will not eat on almost all his paddocks. This point can be illustrated by comparing the following two methods of grazing management:—

Farmer A has saved several paddocks of grass for July and most of August. When this feed is finished he has four or five more paddocks which have been closed since June or early July. He commences grazing these on a three-day and three-night basis, feeding out more hay or silage on the second and third day to make up for the reduction in grass available from the partly-grazed paddocks. These paddocks last about two weeks, when four or five more should be ready for the same process, and this grazing should last until toward the end of September. He may have two or three more paddocks to use singly for at least three days and nights before he has to go back to the first of the paddocks which was saved for winter grass. This paddock will have then been shut up since feeding off in early July, a period of perhaps two months, including August and most of September. There should be plenty of feed in this and the next paddocks in rotation. In October, by which time feeding out should not be necessary, the paddocks are grazed on a two-day and two-night basis, but fewer will be required for the rotation, as growth is much faster. He will then be using 8 to 10 paddocks out of the 14 to 16 into which a good dairy farm should be subdivided for efficient pasture management. The other four to six paddocks are shut up for silage and hay. By careful supplementing of the grass available with saved fodder he has a plentiful supply of feed throughout the spring for milk production and is able to save most of the surplus feed in a few paddocks.

Farmer B, on the other hand, has no winter-saved grass, but is forced to feed early calvers on whatever hay or silage, etc., he has. Furthermore, because of past experience he arranges the calving of the cows for a month or so later than A. As the grass comes away he allows the milkers fresh grass feed by giving them a different paddock each day. For a short time they do well, but with, say, 14 paddocks, the first round of the farm is completed in two weeks, which is little time for the grass to make fresh growth in late winter or early spring. When the second rotation of the paddocks starts there are more cows to graze and the feed in each paddock is cleaned up in a day. By the middle of September or early October the cows tend to leave some feed in each paddock and the farmer decides they should go back into the same paddock for another day. The cows, knowing that there is better and fresher feed in the next paddock, are upset and as a result the yield of butterfat drops. It is therefore decided to continue the system of shifting the cows daily. In the next rotation there is still more feed left each day, some of it being six weeks old, which the cows will not eat. By the end of October or early November, when the feed is growing strongly, farmer B has clumps of feed all over his paddocks which the milking cows will not eat. Because a good part of the farm is in this condition, the acreage of grazing is reduced and he has difficulty in shutting up more than one or two paddocks for hay. Moreover, as soon as dry weather comes and the rate of growth on the grazed areas is reduced the cows are short of milk-producing feed.

Systematic grazing and spelling of pastures on the dairy farm can be relied on to give results in butterfat production, because, other things being equal, the greater the leaf area present the higher is the production from pasture plants. Thus, if reasonably long intervals are allowed between grazings, the total production from the pasture is increased. A suitable system either of day and night grazing in each paddock in turn or a system of grazing day and night paddocks rotationally if the shape and subdivision of the farm make it inconvenient for the cows to go out to the more distant paddocks at night can be planned for almost any dairy farm.

FEEDING OFF ROOT AND FODDER CROPS

On fat lamb farms and sheep farms which grow winter root and fodder crops July is often a critical period. The ground is wet and cold and large numbers of stock are concentrated on relatively-small areas of roots and fodder crops. Though sheep, particularly in the North Island, cannot be kept off such crops indefinitely during periods of rain, it is a bad practice to keep them confined, as is often done, on wet, dirty-cultivated paddocks for long periods. The effect this has on the sheep through their living and grazing in wet, muddy conditions is detrimental, and the effect on the soil, particularly where it is inclined to be clayey, is perhaps not fully realised. It is generally the intention to resow to pasture after such fodder crops, but when the land has been pugged by large mobs of sheep and sometimes cattle for weeks without a spell it is not surprising that the resowing to grass does not give the improvement expected. Considerable damage which takes a long time to remedy can be done to the soil by heavy stocking of cultivated land in wet weather. Both the land and the sheep will benefit if in wet weather stock can be moved from one paddock to another.

PREPARING LAND FOR SPRING-SOWN CROPS

July is generally not a good month for cultivation of ploughed land except in districts with a winter rainfall low enough to permit such work to be continued without danger of damage to the soil. Where turf land is being broken up for such spring-sown crops as cereals, including wheat, for root crops, and for patotoes, peas, etc., advantage should be taken of any favourable weather in July to plough the land so that too much of the work is not left until August and September. The earlier the ploughing is done the better the crop will be, providing the land, if it is clayey, is not too wet when ploughed.

BREAKING UP OLD PASTURES

July is a good month to start early cultivation of old pasture intended for roots or rape. Instead of being ploughed, the turf can be thoroughly disced with well-weighted discs. Such well-disced turf can be deep ploughed in August or September and worked down for seeding in November or early December and this treatment will give good crops. The same treatment is equally good for mangolds, carrots, chou moellier, and other crops sown in late spring or early summer.

FARMING IN NEW ZEALAND

Intensive Grassland Farming

COVERING the production of dairy produce, fruit, eggs, vegetables, and honey, marketing problems, and the expansion of research and extension services, this article concludes a review by P. W. Smallfield, Director of the Rural Development Division, of farming progress in New Zealand during the 1920-45 period. The first section, in the December, 1947, issue of the "Journal," dealt with the development of intensive grassland farming practices on ploughable land and the problems of reversion, deterioration, and erosion on hill-country grazing lands. The second section, in the March issue, described changes in annual crop production and the meat industry.

DAIRY farmers were the pioneers of intensive grassland farming; they were the first important users of phosphatic fertilisers for pasture improvement; they demonstrated the methods of fuller pasture utilisation which enabled more livestock to be carried, thus improving soil fertility and leading eventually to a still higher stock-carrying capacity; and they were in the forefront in farm mechanisation.

In 1920 methods for the intensive management of grassland were known but were not widely adopted. Large areas of dairying land were in comparatively-inferior pasture, and annual crops were commonly used for supplementary feeding—soft turnips, maize, and other green fodder in the summer, and swedes and mangolds in the winter. Subdivisional fencing and water supplies were generally inadequate, and in many districts where roads were not surfaced with metal unpaved dairy yards were still in the deplorable condition that was common in the early 1900's. The progressive steps in dairy farm improvement were, first, the wider adoption of topdressing (which was greatly facilitated by the extensive road-improvement programmes of the late 1920's and early 1930's); the improvement of milking sheds and the handling of milk and cream on the farm through the influence of farm dairy instructors; the introduction of Certified grass and clover seeds making worth while the ploughing up and resowing of inferior pastures; the reticulation of electricity; the development of motor transport; herd testing and the general improvement of dairy cattle; and the wider use of the milking machine, the tractor, and the hay baler.

These developments led to a general standardisation of dairy farm practice on level and gently-undulating land in the higher-rainfall districts; to the all-grass farm annually topdressed, closely subdivided, and with adequate drinking water supplies; to the general adoption of a standard hygienic milking shed and mechanical appliances; and to fairly-uniform levels of intensity of stocking, of butterfat production, and of labour input per acre. Under grass farming conditions a herd of 100 to 120 cows proved the upper limit for efficient management from a single milking shed, and the development of large properties for dairying was carried out by the establishment of several separate dairy units each managed by sharemilkers. Sharemilking also became fairly common on farms milking more than 80 cows; with such herds it ensured for the owner sufficient and suitable family labour for the proper management and milking of the dairy herd, and for the sharemilker it provided the necessary stage in experience and opportunity for saving to secure promotion from a farm worker at a weekly wage to a farmer.

The number of dairy cows in milk (including cows in boroughs) rose from 782,757 in 1920 to 1,699,528 in 1945. The figures for each year, given in Table XXI, show a fairly-steady annual increase up to 1935 except for slight recessions in 1926 and 1927 following very favourable prices for lamb and wool in 1925. Dairy cow numbers reached their peak in 1935, when there were 1,827,962 cows in milk and 124,132 dry cows, giving a total of 1,952,094 dairy cows. This figure occurred in the period of low butterfat prices and was the result partly of the efforts of dairy farmers to increase production and so compensate themselves for low prices and partly of a number of sheep farmers (whose products were even more depressed in price than those of the dairy farmer) entering the industry to secure a regular monthly income to provide the bare necessities of life. After the inauguration of the guaranteed price for butterfat and the subsequent improvement in prices for dairy produce, meat, and wool, dairy cow numbers declined somewhat irregularly, there being a recovery in numbers in 1941 and 1942 in response to the war drive for increased production.

TABLE XXI—NUMBER OF DAIRY COWS IN MILK (at January 31, inclusive of cows in boroughs)

Year	Cows in milk	Year	Cows in milk
1920	782,757	1933	1,723,913
1921	890,220	1934	1,816,402
1922	1,015,325	1935	1,827,962
1923	1,124,671	1936	1,823,358
1924	1,184,977	1937	1,805,405
1925	1,195,567	1938	1,763,775
1926	1,181,441	1939	1,744,478
1927	1,181,545	1940	1,739,874
1928	1,242,729	1941	1,779,603
1929	1,291,204	1942	1,777,239
1930	1,388,872	1943	1,735,544
1931	1,499,532	1944	1,608,505
1932	1,582,664	1945	1,699,528

RISE OF THE JERSEY BREED . . .

Table V (in the first section of this article), which enumerated the number of dairy cows in milk in the North Island by districts in 1925 and 1945, showed that the main increase in numbers occurred in Northland (140,302), South Auckland (64,194), Waikato (179,252), the Central Plateau (70,997), and Taranaki (48,517), and the main decreases occurred in the Western Uplands (4856) and Rangitikei (10,039). In the same period the number of cows in milk in the South Island decreased from 260,724 to 201,325. Increased carrying capacity on existing dairy farms through the general adoption of topdressing was the chief factor in increasing the number of cows in the northern districts, though land development and the establishment of new farms was also a factor in Northland and the Central Plateau. In the districts where dairy cow numbers declined the land previously used for dairying was often changed over to fat lamb production, particularly where the farms were of sufficient size to maintain 750 to 1000 ewes or more.

In the 25 years between 1920 and 1945 the Jersey assumed supremacy as the chief dairy breed in the Dominion, the percentage of Jersey cattle or cattle with a predominating Jersey strain rising from 30 to about 80. The continued popularity of the Jersey cow has been chiefly the result of the high butterfat content of the milk (dairy payments being based on butterfat) and of the majority of Jersey heifers being fit to mate so as to calve at two years old. The ability of the Jersey to produce well as a two-year-old, coupled with the relatively-short productive life of a milking cow (about five years), has made concentration on the Jersey breed more profitable than limiting herd numbers through having to maintain a proportion of heifers of the slower-maturing breeds through an extra winter to calve at three years. Each extra empty heifer wintered reduces the number of milking cows or springing heifers which can be wintered.

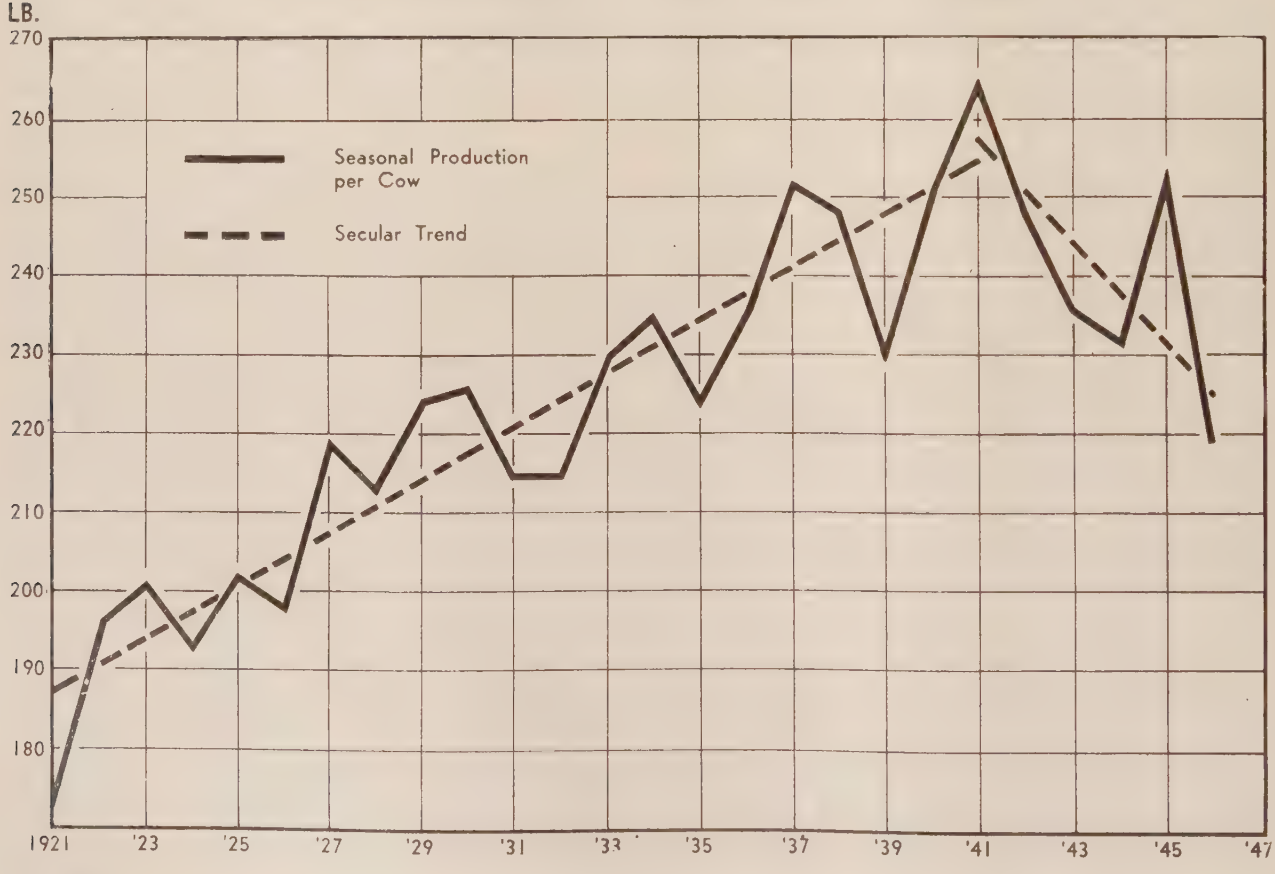
The lead given by successful breeders of both pedigree and grade Jerseys was followed by the general company of dairy farmers, and the breed has been adopted on practically all classes of land, even where other breeds might have been more suited to the environment.

The mean butterfat production per cow in milk during 1920-45 is given in Table XXII. While fluctuating from season to season, depending on the seasonal production of grass and the adequacy of winter supplementary feeding, production showed a general rise of more than 60lb. of butterfat for the first 20 years of the period and then a decline set in, as is shown in the graph below. The improvement in production has been mainly caused by the improved feeding value and increased production from topdressed pastures and by the change from crossbred to high-grade dairy cattle, which change was greatly hastened as herd testing developed. The decline since 1940-41 has been partly the result of unfavourable seasons, but the curtailment of topdressing through the war emergency bringing about fertiliser rationing has also been a factor. The area topdressed with phosphatic fertilisers declined by about 1½ million acres between 1941 and 1945.

TABLE XXII—MEAN BUTTERFAT PRODUCTION PER COW IN MILK, 1920-45

Season		Butterfat per cow (lb.)	Season		Butterfat per cow (lb.)
1920-21	..	174	1933-34	..	235
1921-22	..	196	1934-35	..	224
1922-23	..	201	1935-36	..	236
1923-24	..	193	1936-37	..	252
1924-25	..	202	1937-38	..	248
1925-26	..	198	1938-39	..	231
1926-27	..	219	1939-40	..	251
1927-28	..	213	1940-41	..	265
1928-29	..	224	1941-42	..	248
1929-30	..	226	1942-43	..	236
1930-31	..	215	1943-44	..	232
1931-32	..	215	1944-45	..	253
1932-33	..	230			

Butterfat Production per Cow in Milk, 1920-21 to 1945-46



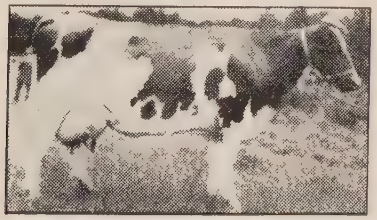
Herd Improvement

Herd recording, which had been started on an organised basis in 1909 by the Department of Agriculture, was considerably extended after 1922, when the "group" system was established and the farmer was relieved of the work of sampling, weighing, and recording. The general replacement of "bucket plants" with "releaser plants" had made it difficult for the dairy farmer to weigh and sample the milk of individual cows, which naturally brought about the change from the "association system," under which the farmer took his own milk weights and samples, to the "group system," under which the work is done by a visiting testing officer provided with sampling, weighing, and testing equipment. Further developments took place with the establishment in 1926 of the Dominion Group Herd Testing Federation and in 1936 of the Herd Recording Council, which has done valuable service in initiating work on herd improvement and sire surveys.

The number of cows under test increased fairly rapidly up to 1929-30, when 284,000 cows, representing 20 per cent. of the total in milk, were enumerated as having been tested under "group," "association own sample," and "dairy company" systems. Since then the proportion of cows tested has fluctuated between 13.5 and 18 per cent. of the total in milk. However, as many dairy farmers do not test every year, the percentage of milking cows with one or more tested records is no doubt greater than those figures.

The testing of pedigree stock, which was initiated by the Certificate of Record system in 1912, was expanded by the introduction of Government Official Herd Testing in 1927; both systems are operated by the Dairy Division of the Department of Agriculture and provide authentic individual production records for pedigree dairy cows.

The reason for the failure of herd testing to continue to expand is probably that it did not provide the rapid means for the improvement of herd production that many farmers expected. Its early advocates inferred that through recording it would be possible to increase production quickly by culling low producers and retaining for herd replacements only the heifer calves from high-producing cows; they ignored, or at best did not stress, the problems of breeding for high production, and the scope for culling was fairly restricted because of disease and other causes. Latterly, sire survey work, which aims at finding the most productive breeding strains in dairy cattle, has come to the fore, and in breeding for production more emphasis is now placed on the sire and less on the dam. This work has been particularly valuable in making possible the initiation of practical schemes of using proved sires for the artificial insemination of an increasing number of dairy cows each year.



Friesian cow Alcartra Clothilde Pietji: C.O.R. 32,312.5lb. of milk, 1145.24lb. of butterfat.

Handling Milk and Cream on Farms

Considerable progress was made in the handling of milk and cream on the farm, in the extension of machine milking, and in the provision of water-heating and cooling facilities in milking sheds. The reticulation of electricity was also a factor of great importance in improving milking shed facilities; as well as providing light for early-morning and evening work (which in itself is a great boon) it provided power for machinery and heat for water with a minimum labour requirement. Direct-coupled motors for each machinery unit eliminated overhead shafting, pulleys, and belts, and brought about lower operating costs and increased efficiency.

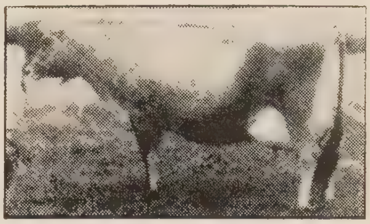
Progress in the handling of milk and cream on the farm was secured through the combination of instruction and regulation. The farm dairy instruction service was extended from a voluntary basis and placed on a compulsory Dominion-wide basis in 1938 so that the service provided for every dairy farmer. Dairy Produce Regulations were brought down to provide for the compulsory grading of milk and cream at dairy factories with differential payments according to grade. Cream grading under this system was introduced in 1926 and milk grading in 1933. The payment by grade provided the incentive for dairy farmers to exercise proper care in the handling of milk and cream on the farm, and the instructional service provided the help necessary for this to be done.

Jersey Bull Grannie's Knight.

However, many dairy sheds fall short of the standards of construction and convenience for efficient working, and the educational service of the Dairy Division still has the work of convincing a proportion of dairy farmers that the milking shed, which is the focal point of the dairy farm and where a large part of the dairy farmer's working life is spent, is worth the expenditure necessary to make it really easy and pleasant to work in and keep clean.

Machine milking became almost universal on dairy farms milking more than 30 cows and Table XXIII (adapted from Abstract of Statistics) shows by size of herd in milk the numbers of farms with and without milking machines in 1946.

A milking machine testing laboratory set up by the Department of Agriculture in 1940 has given manufacturers and farmers useful advice on the design and operation of machines. With the recent tendency to omit hand stripping, the improvement and manipulation of machines to secure complete milking under this system are now of great importance.



Jersey cow Woodlands Felicie: C.O.R. 17,332.6lb. of milk, 1220.89lb. of butterfat.

**TABLE XXIII—
MILKING MACHINES, 1946**

Size of herd (cows in milk)	Farms with milking machines	Farms without milking machines
Fewer than 5	1,091*	24,448
5-9	615	5,568
10-19	2,291	2,857
20-29	4,540	938
30-39	5,587	272
40-49	4,685	81
50-59	3,417	21
60-69	2,766	13
70-79	1,948	7
80-89	1,371	
90-99	783	
100-124	1,198	
125-149	397	
150-199	267	
200 and more ..	126	
Totals	31,082	34,205

* Includes 351 farms with milking machines but no cows in milk for 1946.

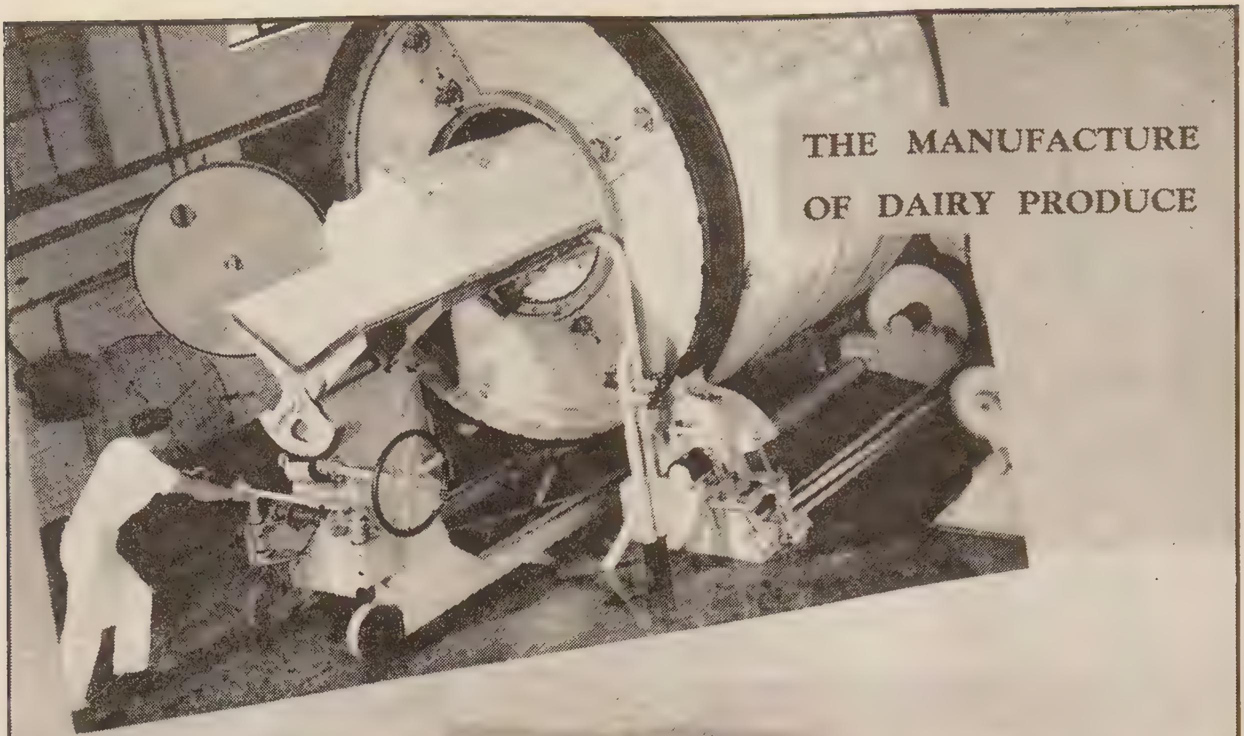
Electricity became the main motive power on dairy farms, and the extent to which it was used at the end of the period is shown in Table XXIV (Abstract of Statistics), which shows that more than 85 per cent. of the 31,082 dairy farms equipped with milking machines used electricity for motive power.

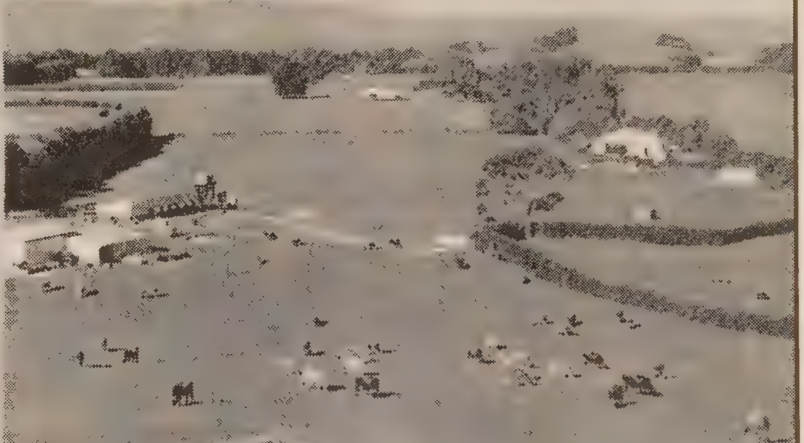
TABLE XXIV—MOTIVE POWER IN USE ON DAIRY FARMS EQUIPPED WITH MILKING MACHINES, 1946

Motive power	Number of farms
Electric motors only	21,482
Internal combustion engines only	4,515
Electric motors and internal combustion engines	5,033
Nature of motive power not indicated	52
	31,082

Electricity for motive power was widely taken advantage of for water pumping and the windmill, which early in the period was a common feature in many districts, practically disappeared. The provision of ample water for livestock, shed washing, and cream cooling was one of the important factors leading to increased dairy farm efficiency.

THE MANUFACTURE OF DAIRY PRODUCE





The production of butter and cheese remained the basis of New Zealand's dairy industry during the 1921-45 period. In the 1921-22 season butter production amounted to 62,881 tons and cheese production to 63,427 tons; in the 1944-45 season butter production was 157,296 tons and cheese production 103,520 tons. Factory design and equipment were improved and the adoption of the large churn (by world standards the largest in use) and butter worker gave great economy in manufacture and improved control of moisture.

[*National Publicity Studios photos.*

Manufacture of Dairy Produce

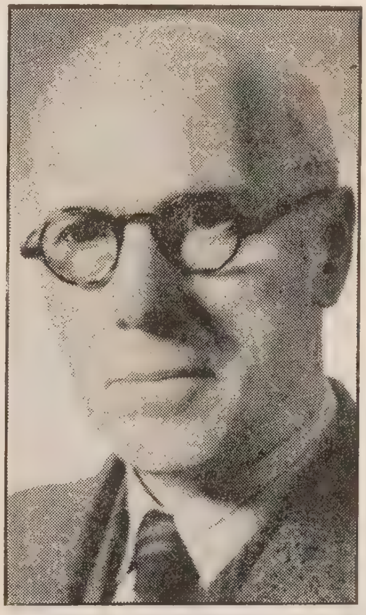
Not only did production increase in the 1920-45 period but the quality of produce also improved. The compulsory grading of milk and cream, the extension of the practice of pasteurisation and facilities for maturing cheese, the introduction of "finest" grades in butter and cheese, and the control of salt content of butter all contributed to this end. Apart from the experiment of "standardised cheese" (which aimed at the reduction of the surplus fat content of cheese made from high-butterfat milk by its extraction from the milk) no radical changes were attempted in the normal processes of manufacture, which over the years had proved their worth. Factory design and equipment were improved; the adoption of the large churn (by world standards the largest in use) and butter worker gave great economy in manufacture and improved control of moisture content; and the pasteurisation of milk for cheese manufacture, which had been started in 1913, was widely adopted. The necessary technical qualifications for factory managers were recognised by the establishment of the Dairy Factory Managers' Registration Board in 1934. Science, through the work of the dairy laboratories at Hawera, Hamilton, and Wallaceville and the Dairy Research Institute at Massey College, made increasing contributions to the improvement of factory technique.

The manufacture and export of "standardised cheese" were important in the three seasons 1928-29 to 1930-31, but the product did not prove acceptable to the dairy trade in Britain and its production was prohibited after August 31, 1931.

One of the greatest changes in the industry during the period under review has been in the packaging of butter and cheese. In its native white pine, a clean, light, odourless, and readily-nailable timber, New Zealand had an ideal material for the purpose, and until comparatively recent years nothing else was used or even considered. However, the enormous quantities required made great inroads into supplies, and the necessity for finding a substitute was soon apparent. Because cheese is not affected by taint, the change to beech, tawa, and *Pinus radiata* for cheese crates was natural and easy. Butter, however, because of its marked and rapid susceptibility to taint and odour, presented a difficult problem. Experiment proved that no known or available wood was a satisfactory substitute. Efforts were turned first to the joining of narrow boards and thus reducing waste, next to the saving of wood by using thin boards reinforced with a frame of stouter timber, a slotted veneer package, then to a combination of wood and fibre board, and finally to an exclusively fibre-board carton. These are manufactured to special specifications and are giving satisfaction, all things considered. The white pine box, so long the standard container, will soon be a thing of history. In an average year some six million butter containers and one and a quarter million cheese crates are required for export purposes, so the importance of this aspect of the dairy industry is obvious.

Responsibility for the procurement of containers lies with the Dairy Board, and suitable standards are laid down by the Dairy Produce Regulations, 1938, administered by the Dairy Division.

Production of butter and cheese remained the basis of the dairy industry. During 1920-37 butter manufacture expanded relatively to cheese, then cheese production increased at the expense of butter until war problems of supply again induced a change in favour of butter. The total butter and cheese production for each season for the 1921-45 period is set out in Table XXV.



W. M. Singleton, Director of the Dairy Division from 1921 to 1944.

TABLE XXV—BUTTER AND CHEESE PRODUCTION, 1921-45

Season		* Butter (tons)	† Cheese (tons)
1921-22	..	62,881	63,427
1922-23	..	81,618	62,399
1923-24	..	76,292	76,749
1924-25	..	85,382	71,827
1925-26	..	79,987	76,008
1926-27	..	89,689	78,214
1927-28	..	93,171	77,505
1928-29	..	102,083	89,112
1929-30	..	116,942	89,096
1930-31	..	119,737	92,893
1931-32	..	126,592	89,089
1932-33	..	151,391	103,559
1933-34	..	164,581	106,780
1934-35	..	160,532	95,723
1935-36	..	171,008	88,499
1936-37	..	180,334	91,315
1937-38	..	168,004	88,468
1938-39	..	150,495	85,264
1939-40	..	160,389	97,637
1940-41	..	167,753	122,371
1941-42	..	135,583	157,524
1942-43	..	144,111	101,756
1943-44	..	139,838	91,747
1944-45	..	157,296	103,520

* Total creamery, whey, and farm butter.

† Factory cheese only, not including process cheese.

Under the guaranteed price system increased differentials were made in favour of cheese to stay the decline of cheese production relative to butter. During the war for one whole and two part seasons (1940-41 and 1942-43) cheese production was stepped up at the expense of butter, and then a change was made again in favour of butter production.

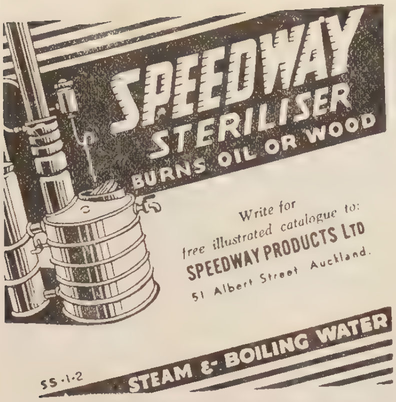
Because of the possibility of a shortage of refrigerated shipping, a survey was carried out in September, 1939, to measure the possibility of making more cheese and less butter. In June, 1940, a second survey followed the receipt of a request from the United Kingdom Government for an increase of 15,000 tons of cheese at the expense of butter and subsequently a request for the maximum production of cheese; after investigation this possible production was placed at 165,000 tons. To enable this change-over to take place it was necessary to direct farmers to change from the supply of cream for buttermaking to the supply of milk to cheese factories. It was also necessary to provide cans and transport for handling whole milk, the necessary vats and other appliances at factories, and houses for the workers. In 1942, at the request of the United Kingdom Government, a change was made back to the manufacture of butter, and all suppliers who changed to cheese in 1940 and 1941 were ordered to revert to the supply of cream.

The manufacture of preserved and dried milk and casein, the expansion of which was influenced by the supply demands of the First World War, did not continue to expand to any very marked extent during the period under review, and butter and cheese remained the staple dairy products. Exports of preserved and dried milk and casein, which reached 22,300,000lb. in 1921, fell to 15,400,000lb. in 1926 and then rose slowly with seasonal fluctuations to reach 35,700,000lb. in 1945.

TABLE XXVI—PRODUCTION OF CASEIN, SUGAR OF MILK, DRIED WHOLE MILK, DRIED SKIM-MILK, DRIED BUTTERMILK, MALTED MILK, CONDENSED MILK, AND EVAPORATED MILK

Season		Thousands of tons	Season		Thousands of tons
1920-21	..	10.3	1933-34	..	13.5
1921-22	..	10.0	1934-35	..	15.8
1922-23	..	10.3	1935-36	..	17.4
1923-24	..	9.6	1936-37	..	17.0
1924-25	..	11.3	1937-38	..	17.3
1925-26	..	9.3	1938-39	..	16.5
1926-27	..	11.1	1939-40	..	17.6
1927-28	..	11.6	1940-41	..	18.1
1928-29	..	12.5	1941-42	..	20.4
1929-30	..	12.6	1942-43	..	20.9
1930-31	..	11.9	1943-44	..	22.9
1931-32	..	12.0	1944-45	..	25.1
1932-33	..	11.0	1945-46	..	25.9

With the development of improved transport, the large dairy factory's economy in manufacturing costs, particularly for butter, was taken advantage of. In 1921 there were 145 butter factories, 344 cheese factories, and 39 factories with dual plants; in 1945 butter factories numbered 116, cheese factories 230, and factories with dual plants 41. Regulations governing the



SPEEDWAY STERILISER

BURNS OIL OR WOOD

Write for free illustrated catalogue to:
SPEEDWAY PRODUCTS LTD
51 Albert Street Auckland.

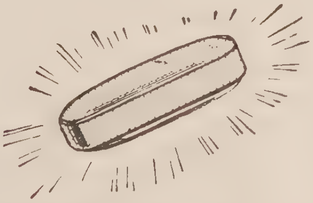
STEAM & BOILING WATER

55·1·2

TOMOANA DAIRY RATION

The COMPLETE STOCK FOOD

For further information write to—
W. & R. FLETCHER (N.Z.) LTD.,
BOX 663. WELLINGTON. J.2



DEMAND exceeds SUPPLY for 1947-48 of "PHENOVIS" Pellets for DRENCHING!

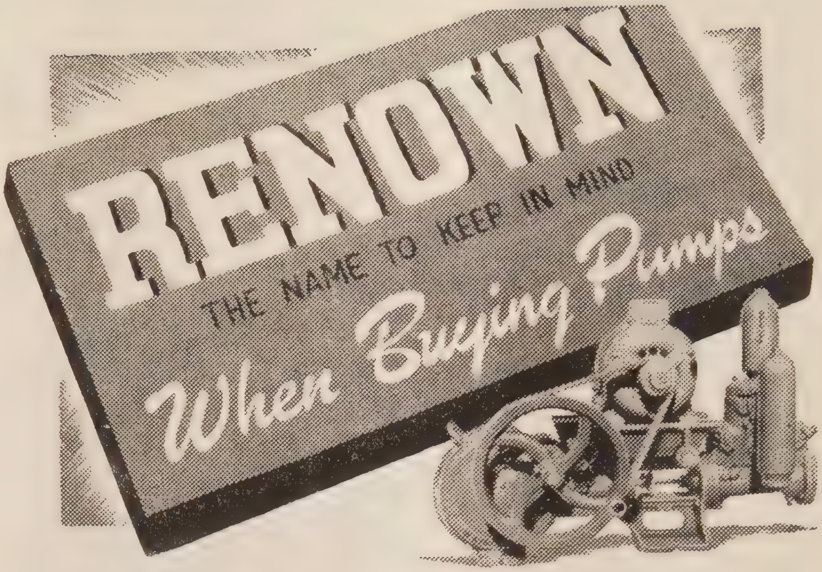
Pellet dosing eliminates staining during administration — is clean and accurate. "Phenovis" 5-gramme Phenothiazine pellets are made and tested by Imperial Chemical Industries Ltd.

Orders Invited NOW for next Season.

Next season's orders are already being filled. Send your preliminary enquiries to us and full particulars will be sent by return mail.
Full details of cost and administration from . . .

SUMMIT

PRODUCTS LTD.
Distributors,
P.O. Box 328, Palmerston North.

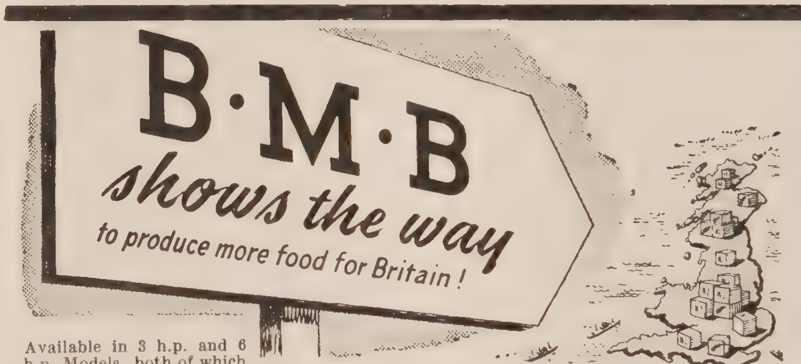


For farms, for homes—for all purposes where water is required away from high pressure water mains, there is a dependable Renown Pump. Consult us about your pump requirements. RENOWN PUMPS ARE MADE FOR ALL PURPOSES.

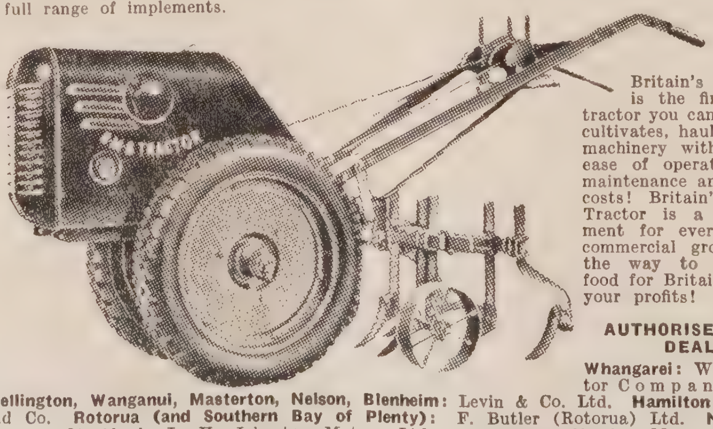
Write for Free printed matter and further information to

W. H. PRICE & SON Ltd.

34-36 Manchester Street, Christchurch. P.O. Box 1084. Established 1879.


B·M·B
shows the way
to produce more food for Britain!

Available in 3 h.p. and 6 h.p. Models, both of which can be supplied with a full range of implements.



Britain's BMB Tractor is the finest two-wheel tractor you can buy—ploughs, cultivates, hauls loads, drives machinery with the greatest ease of operation, minimum maintenance and low running costs! Britain's famous BMB Tractor is a sound investment for every farmer and commercial grower—it shows the way to produce more food for Britain and increase your profits!

AUTHORISED "B.M.B." DEALERS:

Whangarei: Whangarei Tractor Company. **Auckland, Wellington, Wanganui, Masterton, Nelson, Blenheim:** Levin & Co. Ltd. **Hamilton:** H. E. Signal and Co. **Rotorua (and Southern Bay of Plenty):** F. Butler (Rotorua) Ltd. **New Plymouth, Hawera, Stratford:** L. H. Johnston Motors Ltd. **Palmerston North:** Manawatu Machinery Exchange Co. Ltd. **Gisborne:** Williams & Kettle Ltd. **Hastings:** Ross, Dysart & McLean Ltd. **Christchurch:** N.Z. Fruitgrowers' Federation Ltd. **Timaru:** National Mortgage & Agency Co. Ltd. **Dunedin:** Reilly's Central Parking Station Ltd.

zoning of factory suppliers, which were issued after the establishment of the Executive Commission of Agriculture in 1935, provided for the elimination of unnecessary overlapping and competition for supply between companies, and their application has resulted in the much more orderly collection of cream for buttermaking and assisted in the development of larger factories with consequent lower manufacturing costs.

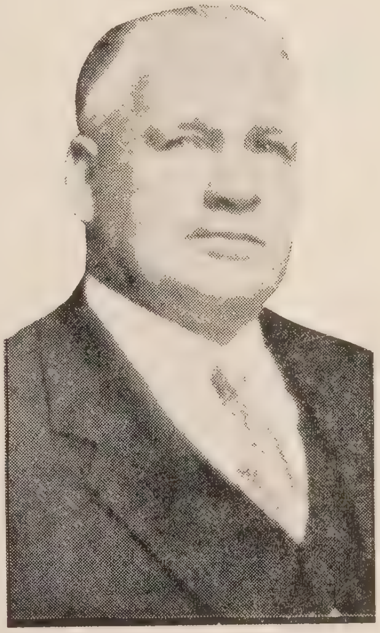
Dairy Produce Marketing

The period opened with high butterfat prices, the average payout for the 1920-21 season, which closed the purchase contract with the Imperial Government, being 2s. 4d. a pound; the price dropped to 1s. 2½d. for 1921-22 but rose again subsequently and between 1922-23 and 1928-29 varied from 1s. 2½d. to 1s. 6¾d. a pound.

The initial fall in price, though undoubtedly it created great difficulties for settlers who had bought land recently at inflated values, based on butterfat at more than 2s. a pound, did not have any real retarding effect on the development of the industry, for the fall in price was met as it was in the depression of the thirties—by the adoption of improved grass-farming methods leading to a greater over-all production.

The fall in price after 1921 and the inauguration of the control board system for meat led to the passing of the Dairy Produce Export Control Act in August, 1923, and the consequent setting up of the New Zealand Dairy Produce Control Board. Formerly (except during the latter and immediately-subsequent years of the First World War, when all exported dairy produce was sold under a "commandeer" contract with the Imperial Government) co-operative and proprietary factories either had marketed their produce on an f.o.b. basis to overseas merchants (usually through local agents) or had forwarded them on consignment for sale through agents in London or other overseas markets. Selling at f.o.b. prices was frequently blamed as a factor weakening the market, and the control board was given powers to organise orderly marketing. During 1924-26 the board was concerned mainly with the regulation of supply and negotiation of freight, insurance, and storage contracts, and the general procedure of marketing was not altered. During the 1926-27 season the board experimented with "absolute control" and price fixing, and then reverted to former procedure. The exercising of absolute control met with strong opposition in the United Kingdom, principally because it included the fixation of prices on the market. That experience showed that in the conditions existing then "the price must, as an ordinary business necessity, be kept at the 'sales point' to enable business to be done." The board had attempted monopoly action without occupying a monopoly position. It was beyond the capacity and resources of the producer boards, separately or in conjunction, to solve the problem of the flooding of the United Kingdom market with primary produce.

In the 1930-31 season butterfat payouts for butter averaged 12.25d. a pound and in the following five seasons they were only 11.45d., 8.75d., 8.75d., 9.50d., and 12.12d. The industry was placed in a very difficult position and producers tried to meet their own financial difficulties by increasing production, but that did not alleviate the basic problem of a congestion of produce on the London market. In April, 1934, a Dairy Industry Commission was set up to "inquire into and report upon the condition of the dairy industry in New Zealand and upon all such matters incidental or relevant thereto as the commission may think proper, with a view to the enactment by the General Assembly of New Zealand of such further legislation in relation to the said industry as will best promote the interests of the persons engaged therein and the general economic welfare of New Zealand." The report of the commission commented as follows on the causes leading to the disastrous fall in dairy produce prices:—



Dynes Fulton, chairman of directors of the New Zealand Co-operative Dairy Company from 1925 to 1934 and one of the most important leaders of the dairy industry during the depression years of the early 1930's.

> The economic problems which confront New Zealand at the present time, and which are of particular moment to the dairy industry, arise out of the changes in the nature of international trade that have occurred in the post-war years. The most notable feature of these changes has been the rapid growth of policies of national self-sufficiency in practically all European countries. Particularly in recent years have restrictive trade practices increased both in scope and intensity, with the result that exporting industries have found it more and more difficult either to hold markets previously established or to penetrate new markets.
>
> Side by side with the tariff and quota obstacles imposed by countries on the import of primary and manufactured commodities has been the growth of the policy of subsidising exports. Rapid production has been the inevitable outcome of this later development. It is clear that attempts on the one hand to limit imports and on the other to increase exports represent mutually-opposed principles, and that the increased adoption of such practices would lead to the virtual cessation of international trade and the piling up of unsaleable surpluses. In practice the result has been for those increasing surpluses to be thrown on the United Kingdom market since, until recently, it was the only free market in the world. This double process of expanding production and limiting importation has been most evident in the case of dairy products, particularly butter, and has led to an acute state of market congestion in the United Kingdom and been accompanied by a serious fall in prices.

The recommendations of the Dairy Industry Commission dealt with both the steps necessary to improve overseas marketing and those to give immediate relief to dairy farmers and increase the efficiency of production. Under the Ottawa Agreement the United Kingdom after 1935 might levy customs duties on dairy produce from the Dominions or after 1936 impose quotas. The commission recommended early discussions to decide the quota question and investigations to improve marketing methods in both the United Kingdom and other overseas markets. For the relief of farmers it recommended methods for the reduction of the interest burden of mortgage indebtedness and the improvement of farm and manufacturing efficiency. It further recommended "with the object of providing an organisation competent to deal with the wider aspects of farm production and the marketing of our primary products generally . . . the setting up of a co-ordinating body, which will function as a permanent executive commission of agriculture to advise the Government on all matters relating to production and marketing and co-ordinate (and where necessary control) the operations of the different produce boards. Co-operation of effort is necessary in matters such as the penetration of new markets, in which all our primary industries have a common interest, and it is equally necessary in matters such as restricting the export of bobby veal, boned beef, and pig meats, in which the interests of two or more primary industries may conflict. Should other trade negotiations fail, the council will be an appropriate body to assist in negotiating barter agreements with other countries."

The necessary authority for putting into operation the main recommendations of the commission was given by the Agriculture (Emergency Powers) Act, 1934, which set up an Executive Commission of Agriculture, reconstituted the Dairy Board, and gave it power to control local marketing; the Mortgage Corporation was set up to provide long-term loans and mortgage relief to farmers.

In 1934 the Dairy Board moved to secure more orderly marketing; except for "spot" transactions, f.o.b. sales were prohibited and the remaining sales on consignment (about 85 per cent.) were sold through a selected group of merchants.

After the advent to power of the Labour Government the Primary Products Marketing Act was passed in 1936, giving power to the Government to set up a Primary Products Marketing Department to buy all primary products intended for export or local consumption. It involved bulk purchase by the Crown at a guaranteed price to be fixed from time to time, thus protecting the producer from price fluctuations on the world market and providing a reasonable standard of living.

From 1936 to 1939 the Marketing Department conducted the marketing of butter and cheese in the United Kingdom by means of a selected panel of selling agents to whom provisional allocations of produce were made. The allocations were reviewed yearly according to the selling ability of the agents, indicated by price returns and marketing and distributive service given. Shipments to the United Kingdom were made so as to ensure regular supplies to distributors throughout the year and to widen the distribution according to ports of discharge. An extensive publicity, advertising, and sales-promotion campaign was carried out supporting the general sale of New Zealand butter and cheese. Along with this policy was conducted a programme aiming at improvement in storage and transport conditions.

At the outbreak of war, as has already been mentioned in connection with meat, the United Kingdom Government agreed to buy New Zealand's exportable surpluses of butter and cheese at agreed prices with provision for the prices to be reviewed periodically. The Marketing Department, in addition to handling dairy produce, was appointed the authority for the bulk purchase and shipment of all food and other primary products.

Guaranteed Price System

Under the guaranteed price as defined in the Primary Products Marketing Act, 1936, the price to be paid for butter and cheese in the 1936-37 season was the weighted average of the realisation received in New Zealand during the 10 years before July 31, 1935, plus an allowance for increased wages costs. For the seasons 1937-38 and 1938-39 the guaranteed price was based on the recommendation of the Guaranteed Price Committee composed of Government and producer representatives, and in fixing the price the committee was to consider the following factors: The national interest of maintaining the stability and efficiency of the dairy industry; the costs involved in the efficient production of dairy produce; the standard of living of persons engaged in the dairy industry in comparison with the general standard of living; marketing costs, and any other factors the committee deemed relevant.

All farm costs and standards are expressed in terms of butterfat, and dairy factories must use a standard system of accounts from which Dominion averages up to f.o.b. can be computed. The payment of the guaranteed price (the basic price and the price variations according to grade) were arranged by the Marketing Department. The standards of efficiency are based on a butterfat production of 100 to 175lb. an acre, 220 to 260lb. a cow, and 6000lb. a unit of adult male labour employed (two adult males for 48 cows with an average of 250lb. butterfat a cow or for 50 cows with an average of 240lb. a cow). Other standards are that a dairy farm is efficiently capitalised at £75 a cow, interest is allowed at 4½ per cent., gross returns from pigs are fixed at 1.54d. a pound of butterfat, and allowance to represent value of house and other perquisites enjoyed by a dairy farmer is fixed at £1 10s. a week.

The costs and standards as determined for the 1938-39 season may be regarded as the basic guaranteed price on to which special "cost allowances" incurred since then have been added. After the outbreak of war the Government undertook to retain dairy farming and factory costs at the 1938-39 level, but it was found administratively impracticable to reduce all costs to this level and the method finally adopted was to assess the increase in costs through special Cost Adjustment Committees and to make compensating farm and factory cost allowances. Table XXVII sets out the guaranteed price for 1938-39 and the increases because of cost allowances up to 1945-46.

A differential payment of 2d. a pound for butterfat for milk supplied for cheesemaking has been made, and the average payouts since the inception of the guaranteed price (including allowances) have been as follows:—

Season		Butter (pence)	Cheese (pence)
1936-37	..	13.558	15.176
1937-38	..	14.812	16.389
1938-39	..	16.087	18.060
1939-40	..	16.179	18.091
1940-41	..	16.106	18.043
1941-42	..	16.017	18.025
1942-43	..	16.569	18.577
1943-44	..	17.597	19.655
1944-45	..	19.790	22.055
1945-46	..	20.568	22.884

Guaranteed prices are paid on butter and cheese on an f.o.b. basis and, though the prices are assessed to provide a certain price to the average supplier, the average payouts have slightly exceeded the assessed price. Further, the payout to suppliers by companies varies according to variations in factory costs, which may be above or below the standard factory costs allowed. Similarly, each supplier to a factory, while receiving the same payment per pound of butterfat as other suppliers, will have earned more or less per man, per cow, or per acre according to the extent that his farming efficiency is above or below the standards established in the guaranteed price.

Liquid Milk Trade

Improvements in the supply of liquid milk to urban areas followed the establishment of a Royal Commission in March, 1943, to report on "the present circumstances of the supply of milk to the four metropolitan areas" and "the alteration and reorganisation in methods of supply, collection, treatment, and distribution that may be necessary in such areas to ensure at reasonable prices adequate supplies of milk of high standard." The commission recommended the setting up of a central authority to organise and control the trade in liquid milk and the necessary local organisation. The commission also recommended that the price to be paid to producers should "be based on the guaranteed price with an allowance for other costs involved in producing for only milk supply."

On receipt of the commission's recommendations the Government established a Town Milk Office to act as an interim central authority until a permanent Milk Council was appointed. The Milk Act, 1944, set up the council, which first met in February, 1945, and began its work of organising the provision of an adequate supply of milk of good quality for human consumption and placing production, treatment, and distribution on a sound basis. In determining the national price to be paid to town-milk producers the council took as a basis the guaranteed price payment for the standard dairy factory-supply farm and added the additional rewards and other alterations in standards as recommended by the Milk Commission. The labour reward on the standard town-milk farm was increased by £1 5s. 6d. a week for the owner and 15s. a week for farm employees. Interest on capital was assessed at 4½ per cent. on a capitalisation of £110 a cow, as against £75 a cow on the

TABLE XXVII—GUARANTEED PRICE (plus farm cost allowances) FOR BUTTERFAT FOR BUTTER

Cost groups	Pence a pound of butterfat			
	1938-39	1943-44	1944-45	1945-46
Working and maintenance ..	5.340	6.107	6.757	7.254
Capital charges	3.240	3.240	3.240	3.240
Labour rewards	8.840	9.450	10.920	11.440
	17.420	18.797	20,917	21.934
Less pig returns	1.540	1.540	1.540	1.540
Guaranteed price	15.880	17.257 *	19.377 *	20.394 *

* Plus allowance.

factory-supply farm. The general standard of two men to 48 cows was reduced to two men for 40 cows. The effect of these adjustments was the fixing of a basic price of 12.97d. a gallon for milk averaging 4.3 per cent. butterfat.

Fruit

Commercial orchards which had been planted in the 1910-20 period gave materially-increased production in the mid-1920's, when there were about 20,000 acres of bearing commercial orchards. Many of the orchards planted on low-fertility land did not thrive and were abandoned or the land used for pastoral purposes. Between 1925 and 1945 the number of apple trees declined by 46 per cent. (from 2,285,000 to 1,239,000) and of pear trees by 38 per cent. (from 218,000 to 135,000). Practically the only district that did not show a decline during the whole period was Hastings, where numbers increased between 1925 and 1936 but during the past 10 years have declined. On the other hand there was a slight increase in the number of stone-fruit trees. Peaches showed the most marked increase, rising from 186,000 trees in 1925 to 250,000 in 1945. In recent years the incidence of disease, particularly brown rot, has severely checked stone-fruit production in domestic gardens, and commercial production has tended to concentrate in districts where the climate is favourable for production and where marketing and processing facilities are available. Citrus production developed into an organised industry, with packing and curing depots centred at Kerikeri, Whangarei, Auckland, Tauranga, and Gisborne. In total, the expansion of certain sections of the fruit industry did not quite balance the decline in others, and in 1945 the total area in orchards was only 19,614 acres.

The most important decline in fruit production has been in apples, and it is now generally realised that production on low-fertility land is uneconomic. Production from richer land gives better results but cost of production bears a higher rent, which is fixed not so much by the value of the land for orcharding as by its value for alternative forms of production such as meat and dairy produce.

Apples as they are picked from the trees are a low-value product compared with wool, meat, and dairy produce and require proportionately much higher packing and marketing charges. In the development of the export trade apples worth, say, 2s. 6d. picked from the trees might cost 11s. 3d. landed in London and might sell below landed cost, which would be disastrous for the grower, who, if the apples sold as low as 8s. 9d., might get nothing. Hence the inauguration of a Government guarantee for export of 1d. a pound on apples and pears.

Marketing difficulties and the example of Meat and Dairy Boards led to the formation of a Fruit Export Control Board in 1924. The New Zealand Fruit Growers' Federation, which had been formed in 1910 and previously had sponsored the export trade in fruit, felt that as the Government guarantee was likely to be discontinued some board with wider powers was necessary to control fruit exports.

The recent average annual apple production has been about 2,500,000 cases and pear production 300,000 cases. Up to 1939 from a million to a million and a quarter cases were exported yearly and the remainder consumed in the country. With the outbreak of war the export ceased because of lack of shipping space. The Internal Marketing Division took over the apple and pear crop, made use of the export organisation and staff of the Fruit Export Control Board, and utilised its experience for storing and distributing the crop for local consumption. With the curtailment of supplies of tropical fruit during the war, the whole of the apple and pear crop was disposed of on the local market, and a Fruit Marketing Council consisting of five producers and five Government appointees was set up as an interim advisory body to supervise marketing.

Vegetables

The area under market gardens, which amounted to 3540 acres (exclusive of boroughs) in 1920, increased slowly until it reached 9432 acres in 1941; because of labour shortages the area fell to 9050 acres the next year, but then rose rapidly with war demands for fresh vegetables for the Pacific theatre until in 1945 16,826 acres were in vegetable production. The shortage of labour during 1941-42 caused a shortage of vegetables just at the time when demand was greatly increased. To supply the vegetables for civilian and military requirements, the Government undertook production on leased land under the Services' Vegetable Production Scheme and encouraged commercial production by arranging contracts.

The Services' Vegetable Production Scheme used labour which could not be employed readily by commercial growers; women workers, very few of whom had had any experience, formed about half the employees and a great deal of the harvesting was carried out by schoolchildren. The scheme was initiated in the winter of 1942 and all projects were closed in the autumn of 1946. More than 4000 acres were cultivated for vegetables under the scheme, and commercial production by means of contracts was expanded by about the same area. To supply the demands of the American forces in the Pacific processing plants in the Dominion were greatly enlarged. Five dehydration plants were erected, canning facilities extended, and packing sheds erected to crate vegetables for export in a fresh condition in cool storage.

Wartime expansion in production quickened the mechanisation of the industry, and light rubber-tyred tractors equipped with inter-cultivation, sowing, and fertiliser-distributing implements were in wide use at the end of the period, as was powered spray equipment for both disease and weed control.

Apart from mechanisation, the most notable feature in vegetable production during the period has been the specialisation of production in areas most suited to particular crops. This specialisation was greatly helped by the development of road and rail transport, the most important example having been the opening up of the Ohakune vegetable area, which specialises in late summer and autumn cabbage, brussels sprouts, and carrots.

Honey

The expansion of the beekeeping industry was greatly assisted by the improved white clover content of pastures, brought about by liming and phosphatic topdressing, and by the advent of motor transport, which enabled individual beekeepers to extend the field of their operations. While the number of registered beekeepers increased only from 6375 in 1920 to 6507 in 1945, the number of hives owned rose from 84,326 to 129,576. Honey exports, which were about 1,000,000lb. in the early 1920's, reached a maximum of 2,330,000lb. in 1929 and then fluctuated considerably because of seasonal and price factors and fell as low as 300,000lb. in 1937.

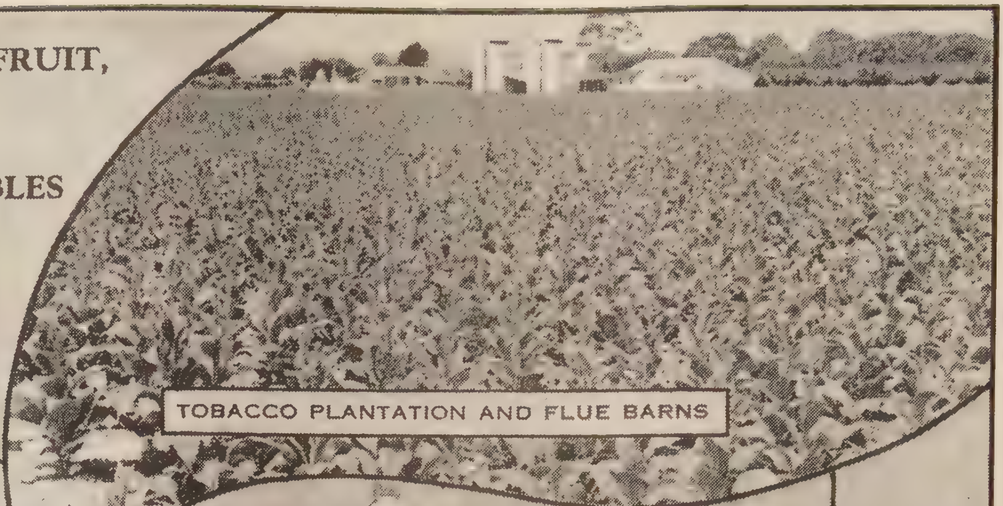
The export of honey had been pioneered by the Honey Producers' Association Ltd., which continued the work after it was made the agent of the Honey Export Control Board in 1924. Difficulties arose between the board and the Honey Producers' Association and in 1938, when the producers' co-operative association was in difficulties, the Internal Marketing Division took over the assets and worked with producers on a basis of voluntary supply. With the advent of the war and sugar shortages, sales from the apiary became attractive and the scheme for voluntary supply to I.M.D. was neglected. War emergency regulations which provided for producers sending a portion of their produce to the Division for military and civilian priorities remained in force for three years but were revoked at the end of the war, and with the continuance of sugar rationing the local demand has been able to use all the honey produced.

Tobacco

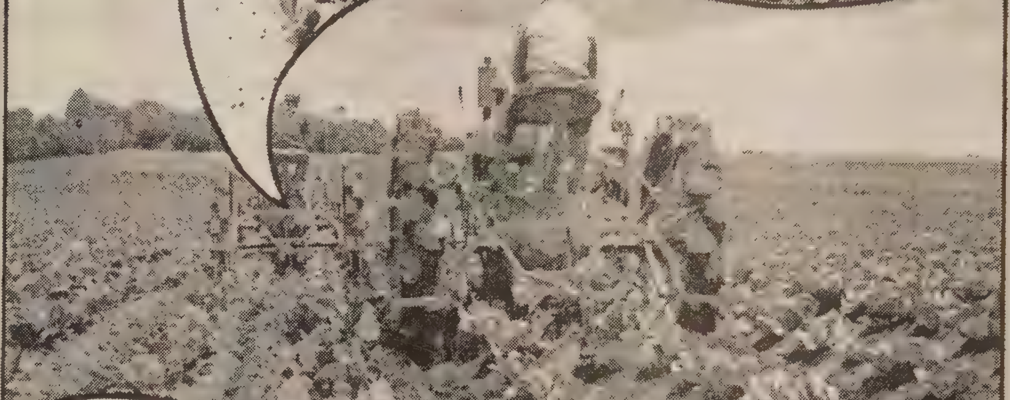
Commercial tobacco production, which had begun in 1912, expanded considerably in the late 1920's and early 1930's and, after considerable trial to locate suitable production areas, the industry became centred in the Nelson district after the late 1930's. Production reached about 2000 acres in the early 1930's and rose slowly to 2500 acres in 1939-40, after which during the war production was again expanded and reached nearly 3500 acres in 1945.

The depression of the 1930's brought low prices for leaf, and a Tobacco Board was set up under the authority of the Tobacco Industry Act, 1935. It has since regulated the industry by fixing prices for leaf, licensing growers, and providing for the absorption of the domestic crop by requiring manufacturers to use 30 per cent. of local leaf in the manufacture of tobacco in New Zealand.

TOBACCO, FRUIT, AND VEGETABLES



TOBACCO PLANTATION AND FLUE BARNS



CULTIVATING AND MOULDING A CABBAGE CROP

HAWKE'S BAY PEAR ORCHARD

Commercial tobacco production expanded considerably in the 1921-45 period, and after trial in various localities became centred in the Nelson district, where nearly 3500 acres were grown in 1945. Many commercial orchards planted on low-fertility land during 1910 to 1920 did not thrive, and between 1925 and 1945 the number of apple trees declined by 46 per cent. and pear trees by 38 per cent. Hastings was the only district which did not show a decline over the whole period. Wartime expansion in vegetable production quickened mechanisation of the industry, and tractors fitted with inter-cultivation, sowing, and fertiliser-distributing equipment were in wide use in 1945.

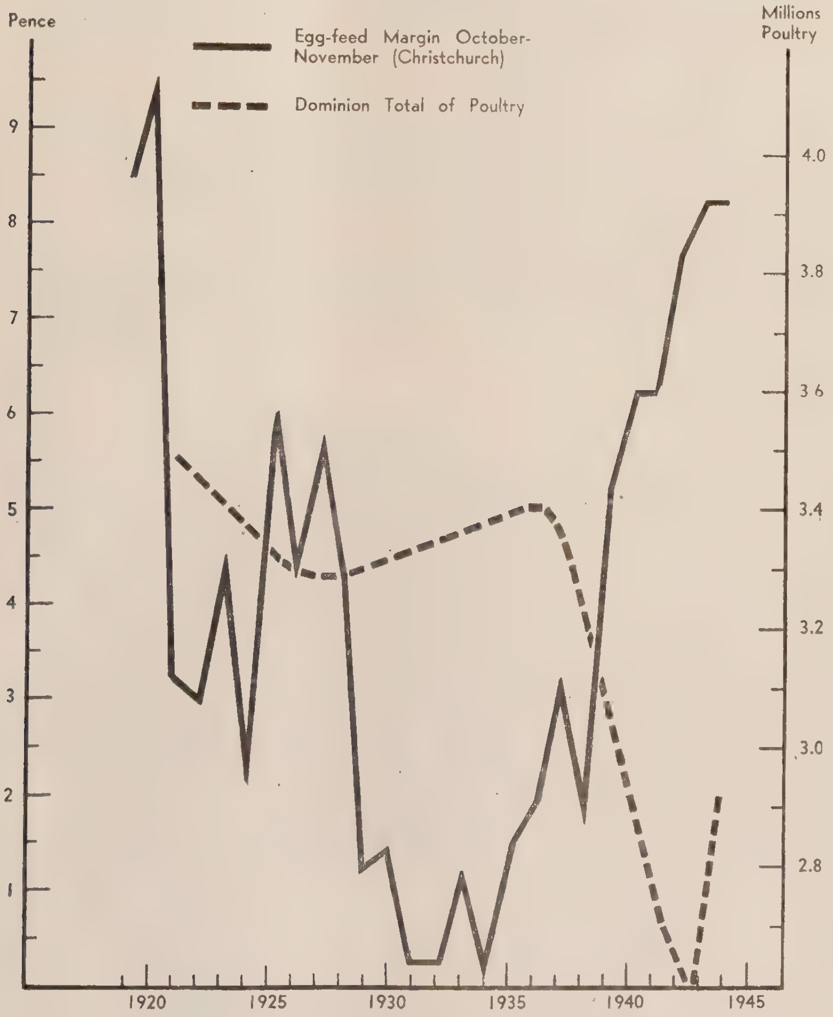
Poultry Industry

The poultry industry suffered severely from the price recessions in the 1920's and 1930's. With the industry divided into commercial producers, sideline producers, and backyard poultry keepers, abundant grain supplies bring overproduction of eggs in the summer, as the sideline and backyard poultry keepers are not always concerned with recovering full costs of production; in times of depression, in the search for extra income, they will continue to produce eggs when the sale price does not much exceed cost of necessary feed and is insufficient to cover wages, interest, upkeep of plant, and overhead.

The trends in feed costs and egg prices during the flush of the season (October-November) each year from 1920 to 1945 are illustrated in the graph below. The egg-feed margin has been calculated by deducting from the retail cost of the feed required to produce one dozen eggs the price a dozen received by the producer (wholesale price less an assumed cost of marketing of 3d. a dozen). The poultry numbers (fowls only) are the census figures supplemented by estimates for 1942-43 and 1943-44. The margin fell as low as ½d. a dozen in the early 1930's, bringing about a general instability in the industry which culminated in the formation of the Poultry Board by an enactment in 1933 which provided for the registration of all commercial poultry runs where more than 25 head of poultry are kept and for the formation of an elected board to organise and develop the industry.

With the wartime shortage of grain, egg marketing was brought under the partial control of the Internal Marketing Division and prices were fixed under the stabilisation policy. The increased demand for eggs led to marketing problems, for with the price of eggs pegged at 1939 prices eggs were diverted from organised markets. Subsidies given for eggs passing through organised and approved egg floors encouraged orderly marketing, but the real difficulty in expanding production to meet the demand in later war years was the inadequate feed supply, as the industry has grown increasingly dependent on imported Australian grain.

Egg-feed Margin and Poultry Population



Forestry

With the passing of the phase of widespread conversion of bushland to pasture, the country began to realise that positive steps were necessary to safeguard the remaining forests and to provide for future timber supplies. A Department of Forestry was formed in 1919, and the Forest Acts of 1921-22 laid down an effective policy for the State Forest Service covering the provision of timber supplies, the protection of the headwaters of rivers and streams, and the utilisation of land unsuitable for farming. The State Forest Service took over the administration of all forested Crown lands and carried out a vigorous planting policy, as well as encouraging local body and company-promoted plantations.

The present indigenous forests consist of 6 million acres of State forests which are permanently dedicated to soil protection or controlled timber production; 3 million acres of provisional State forests which are administered as State forests but of which suitable areas may be released for settlement; 2½ million acres of reserves, covering national parks, scenic reserves, etc.; and 3 million acres of forest on land not controlled by the Crown. The exotic forests cover about 900,000 acres and consist of 400,000 acres of State forests, 300,000 acres of company-promoted forests, and 200,000 acres of local body and private plantations. The exotic forests are largely centred on the Central Plateau area of the North Island, where the volcanic ash showers provide uniform soil conditions over large areas and so allow of the organised planting of vast forests of *Pinus radiata*.

These plantations form the chief timber and paper-pulp resources of the country for the future. *Pinus radiata* timber, which comprised only 2 per cent. of the timber milled in 1919-20, rose to more than 25 per cent. of the total in 1944-45.

Depression and Marketing

The period from the mid-1890's to the outbreak of war in 1914 was one of generally steadily-rising prices and of no great marketing difficulties. The war of 1914-18 introduced the first interference with normal marketing arrangements through the Imperial Government's requisition of all New Zealand's exportable primary produce. However, high prices more than compensated for Government-controlled purchase, and it was not until 1921, when controls ended and prices fell, that marketing methods were brought under critical examination, which culminated in the procedure of forming producer boards to control marketing. The services the boards gave were

Upper photograph on opposite page by National Publicity Studios, centre by Sparrow Industrial Pictures Ltd., and lower by News Photo Service.

Don't go short of a Smoke!

Now's the time to get your tobacco in bulk. It costs no more, and you'll always have a smoke on hand.

PIPE TOBACCO
SERVICE MIXTURE: Light, Medium and Dark—£1 6s. 4d. per lb post paid; 2½lb. carton, £3 3s. 2d. post paid.

CIGARETTE TOBACCO
FINE CUT: £1 5s. 8d. per lb. post paid.
Please add exchange to country cheques.

H. THOMAS LTD.,
126 FEATHERSTON ST., WELLINGTON

A Sound Business Knowledge

is Vital to

PROFITABLE FARMING

The successful farmer is the man who has a thorough grasp of the business side of farming in addition to his practical knowledge. You MUST have sound training in farm finance, book-keeping and legal matters related to farming if you want to get to the top, and this special knowledge can be easily acquired with the aid of The Farm Accounting Association's special Business Correspondence Course for farmers.

Post the Coupon NOW for full particulars of this outstanding aid to successful farming.

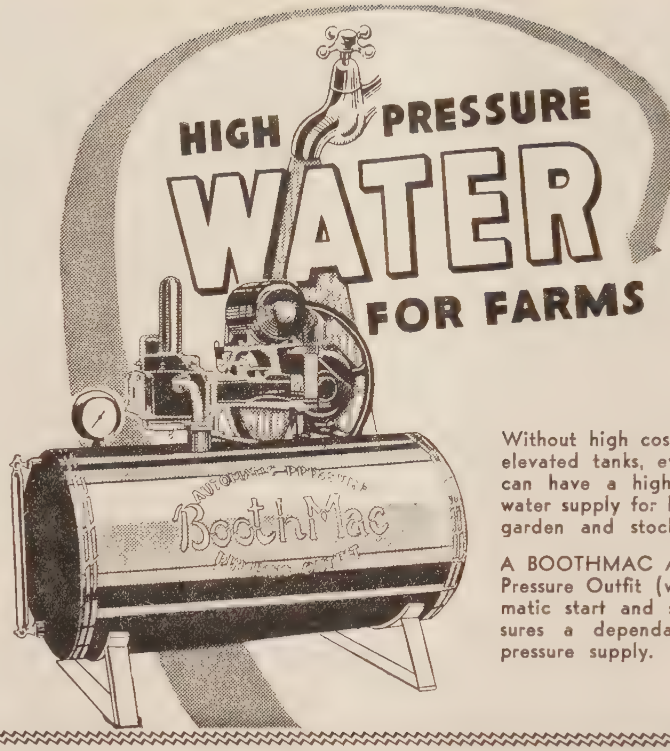
THE
FARM ACCOUNTING
Association of N.Z. (Inc.)
G.P.O. BOX 693, DUNEDIN

Please send me without obligation, Free Brochure and details of your Home Study Course.

Name ....

Address ....

....



Without high cost, without elevated tanks, every farm can have a high pressure water supply for home use, garden and stock.

A BOOTHMAC Automatic Pressure Outfit (with automatic start and stop) ensures a dependable high pressure supply.

WRITE
FOR
DETAILS

BOOTH, MACDONALD & CO. LTD.
Branches Throughout New Zealand.
Head Office: P.O. Box 99, Christchurch.

Long Service Record

The Bank of New Zealand has been a vital factor in the success of very many businesses and farming enterprises over the past 86 years. Today, with more than 250 Branches and Agencies in the Dominion, it continues to serve New Zealanders with unequalled banking facilities.

BANK OF NEW ZEALAND

SERVING THE DOMINION SINCE 1861

11.7F

really valuable, but with the depression of the 1930's they were powerless to protect producers from drastic price fluctuations. From a position of satisfactory prices and an apparently-unlimited market, producers were faced with prices below cost of production and a contracting market.

The burdens of the depression were felt most severely by those least able to bear them. Farmers on marginal land who had been barely able to obtain a living at normal prices either were forced off their holdings and joined the throng of urban unemployed or had to witness the general deterioration of their properties through neglect of maintenance. On the other hand, farmers on more fertile land tried to meet the fall in prices by increased production, which in turn resulted in still lower prices. Various relief measures were introduced aiming at lowering cost of production. Award wages were reduced 10 per cent.; rent and interest were reduced 20 per cent.; mortgage relief legislation gave power for the writing off of excessive indebtedness; subsidies were given to county councils to compensate for rate reductions; wage subsidies were given for the employment of labour in farm development and maintenance; freight rates on farm produce were reduced; subsidies were given on fertilisers; the New Zealand £ was depreciated, and finance was provided for farmers. These adjustments gave immediate and considerable relief to farmers but could not offset fully the high level of costs and fixed commitments that had come about before the fall in prices.

With the advent to power of the Labour Government, the Primary Products Marketing Act was passed in 1936 giving power to the Government to set up a Primary Products Marketing Department to buy all primary produce intended for export or local consumption. Up to the outbreak of war in 1939 butter and cheese were the only major products affected by the Act. This new marketing policy sought to protect the producer from price fluctuations on the world market and to give security and a reasonable standard of living.

The marketing evolution between wars reflects the need for co-ordination in world trade, for the depression marked a period when expanded production under efficient methods of farming meant disaster for farmers in all countries (even under efficient methods as generally applied in New Zealand), and at the same time hunger for millions in Great Britain and other industrial countries. This experience has prompted the United Nations Conference on Trade and Employment and the formation of the Food and Agriculture Organization with the purpose, among others, of endeavouring to formulate plans for commodity agreements for primary products and so overcome "the special difficulties such as the tendency toward persistent disequilibrium between production and consumption, the accumulation of burdensome stocks, and pronounced fluctuations in prices"—in short, that surpluses of bountiful seasons may be used to offset the scarcities of unfavourable ones and the necessary buffer stocks shall not be used to depress prices unnecessarily.

The Second World War

The necessities of war involved a measure of control over farming. The possibility of war was clearly recognised after Munich and steps were taken during the latter part of 1938 and the early part of 1939 to provide the necessary administrative machinery to cope with any emergency which might arise. Plans were made with the United Kingdom Government for the purchase of exportable primary produce from the Dominion and for the Marketing Department to be the authority for the bulk purchase and shipment of various food and other products. The Emergency Regulations Act was drafted, together with the regulations necessary to mobilise and control the full resources of the Dominion.

The Hon. W. Nash, Minister of Marketing from 1936 to 1941.

The Primary Industries Emergency Regulations, 1939, and subsequent amendments covered the production and processing of all primary products. Full powers of control were not required or exercised, but under the authority of the regulations control was exercised over the manufacture of butter and cheese, the sale of fat stock, seeds, and other essential supplies, and the rationing and manufacture of fertilisers.

Primary Production Councils were organised so that the Administration was placed in touch with individual farmers. District councils were set up composed partly of district committeemen and partly of representatives of other farming organisations and labour. Each district committee was composed of members who were in contact with all the farmers in their locality. Finally, a national council representing the district councils and farmers' organisations advised the Minister of Agriculture and the Primary Industries Controller on policy matters and directed the work of the district councils.

The Primary Production Councils did an immense amount of voluntary work in connection with manpower on farms, reporting on appeals for the armed forces appeal boards, estimating labour requirements for harvesting and organising both voluntary and army labour, organising drives for production, and rationing supplies of essential commodities. Without such an organisation it would have been impossible to have stimulated production, rationed essential supplies, or provided the necessary farm labour.

The first phase of the war, from September, 1939, to December, 1941, was marked by adherence to traditional farming practice and by endeavours to increase production by better management and feeding of flocks and herds. Shipping difficulties arose fairly early in the war, but the erection of additional cool-storage space enabled produce to be held until ships were available.

Interference with the loading facilities at Nauru Island, coupled with the sinking of phosphate-supply ships, made it impossible for the Dominion to obtain the full quantity of phosphate rock required and it became necessary to ration fertilisers. To make the fullest use of available supplies of phosphate, the National Council of Primary Production recommended the manufacture of serpentine superphosphate, made by adding one part of ground serpentine rock to three parts of superphosphate. To increase phosphate supplies further the phosphate quarries at Clarendon, Otago, were reopened and supplied small quantities of the better-quality rock for superphosphate manufacture, as well as low-grade rock for direct use in fertiliser mixtures.

With the entry of Japan into the war many new problems arose. Increased attention had to be paid to the production of food crops, and the Dominion was faced with increasing shortages of essential supplies which were later largely overcome through lend-lease aid.

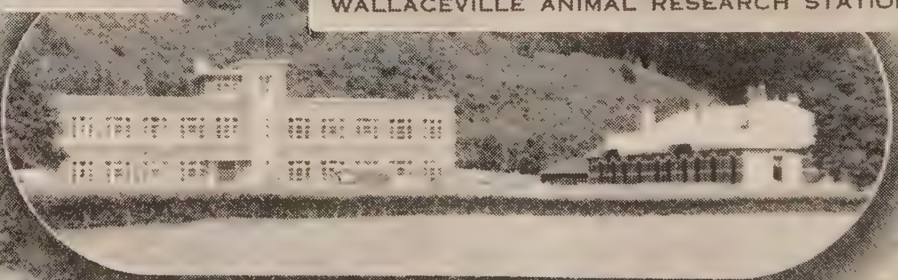
Shortage of labour on farms, which was a limiting factor in production throughout the war, became acute soon after Japan's entry into the war. Farm work is a skilled occupation, particularly in New Zealand, where livestock are so important. Labour difficulties in many important industries in the war effort were overcome by declaring them essential, which meant that labour could be directed to them and employees could not leave or be discharged without the approval of the National Service Department. Farm labour shortages could not be overcome in that way; the farmer and his employees live either together or in such close contact that control as with other essential industries was not feasible. The policy through the war was to retain essential workers on farms and arrange for the placing of volunteer workers. After the war situation in the Pacific became less acute, men were returned from the

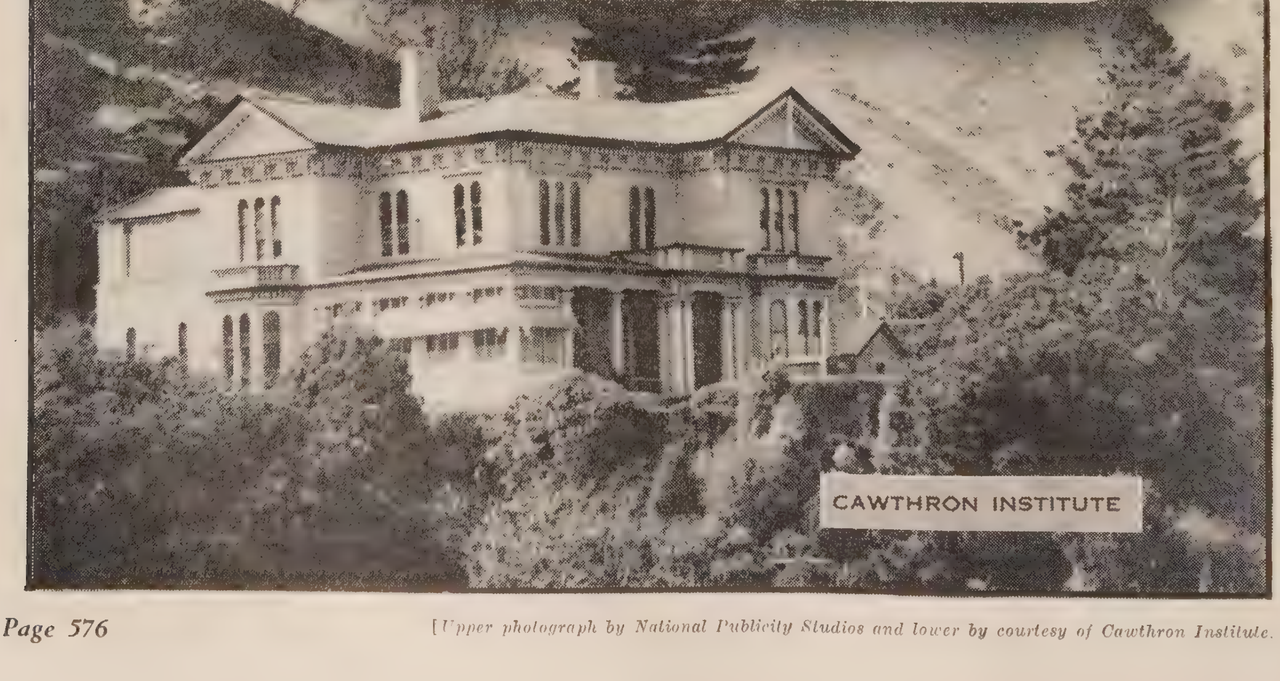
RESEARCH AND EXTENSION

By the end of the 1921-45 period research and extension services were beginning to reach the stage of organisation and achievement warranted by the importance of the farming industry. Their efficiency in raising the standard of farm practice had been proved; dairying and animal husbandry, crop and pasture production, fruit, vegetable, and other subsidiary industries had all benefited, and research and extension workers had gained a definite place in the agricultural organisation of the country.

MASSEY COLLEGE

WALLACEVILLE ANIMAL RESEARCH STATION





CAWTHRON INSTITUTE

[Upper photograph by National Publicity Studios and lower by courtesy of Cawthron Institute.

forces for farm work and women recruited for land work. Army labour was first used in the cereal harvest in the South Island in the autumn of 1943 and extended in the following year to hay and silage harvests in the North Island. The work was organised through the Primary Production Councils.

The rationing of many farm requisites, such as imported machinery, tractors, fencing wire, wire netting, and gumboots, became necessary after Japan's entry into the war, and the work was done by the Department of Agriculture through Primary Production Councils, who nominated priorities so that supplies could be distributed to farmers in greatest need and who would make the best use of them.

Two other important features of this period were the policy of economic stabilisation and the Servicemen's Settlement and Land Sales Act, 1943. On December 15, 1942, the Prime Minister broadcast an address on economic stabilisation outlining the Government's policy to prevent inflation. In September, 1939, all prices had been brought under control through the Price Tribunal, and in September, 1941, prices of 38 of the more important commodities entering into the cost of living were stabilised. After the announcement of December, 1942, steps were taken to stabilise additional commodities and wages; an agreement was entered into with the Farmers' Union for farm products stabilisation accounts to be kept by the Marketing Department and provision made for consultation with various sections of the primary industries for any necessary price adjustments to meet increased costs.

With the New Zealand system of easy transfer of land, increased prices are quickly reflected in increased land values, and there is no doubt that the Servicemen's Settlement and Land Sales Act has been of great importance in the policy of stabilisation. The Act deals with the acquisition of lands for servicemen settlement and the control of both rural and urban land values. It has prevented the problem of inflated land values which occurred as a result of the high prices for produce in the 1914-18 war.

Science and Practice

Advances in the science and practice of farming depend very largely on the close co-ordination of efficient research and extension services, and in 1920 neither were adequate for the needs of the farming industry. The war had reduced the extension and research staff of the Department of Agriculture, Gilruth no longer directed animal research, and the large State farms which had been established in the early 1900's had lost Clifton's guiding hand and had practically ceased to function as centres of either research or instruction. The Biology Section of the Department of Agriculture was, however, particularly active in furthering the science and practice of farming. This section, under A. H. Cockayne, provided the nucleus from which came a very large measure of the important research and extension work carried out during the 1920-45 period. From the staff trained in the Biology Section originated important grassland, crop, and plant-disease and weed-control research programmes and the extension services of the Fields Division. The workers sought the co-operation of farmers and built up singularly successful methods (largely through the use of co-operative experiments) of bringing the results of scientific work to the aid of farmers. In 1922 Cockayne was made Director of the Fields Division, and was then able to co-ordinate the plant research and extension services of the Department.

In the early 1920's, apart from the Department of Agriculture, Canterbury Agricultural College, Lincoln. and the Cawthron Institute, Nelson, were the only institutions actively engaged in the advancement of the science and practice of farming. From Hilgendorf's work on plant selection at Canterbury Agricultural College emerged the Wheat Research Institute and the importance attached to plant breeding and selection work generally during the period. The Cawthron Institute, which was established in 1920 as the result of a munificent bequest by the late Thomas Cawthron, became active in research in connection with soils, mineral deficiencies, insect control, plant diseases, and in particular the problems of the gardener and fruit grower.

However, there was a public demand for a much more active programme of research and extension work. The Board of Agriculture, which had been set up under the Board of Agriculture Act, 1913, "to advise the Minister of Agriculture with respect to such matters and questions in connection with the purposes of agriculture and other rural industries as it thinks fit or as may be submitted to it by the said Minister," was at that time more than fully occupied with problems of commerce resulting from the fall in prices after 1921 and did little to investigate the needs of research and extension. However, it advised the improvement of the extension services, and the consequent reorganisation and expansion of the Fields Division were the first and certainly a very important phase in the initiation of a more active policy of bringing science to the help of practice.

In 1926, following a report from Sir Francis Heath, Director of the Scientific and Industrial Research Department, England, a Department of Scientific and Industrial Research was established, and through the Council of Scientific and Industrial Research it has worked to expand and coordinate agricultural research, partly through its own and the Department of Agriculture's research organisations and partly by assistance given to research institutes such as the Wheat and Dairy Research Institutes and to the two agricultural colleges.

The demand for higher agricultural education in the North Island led to the establishment of Massey Agricultural College, which was opened in 1928. In 1923 Sir Walter Buchanan gave £10,000 to Victoria University College for the founding of a chair of agriculture, and at about the same time Auckland University College was enabled to use a gift of £20,000 from Sir John Logan Campbell for the same purpose. By the New Zealand Agricultural College Act, 1926, the two colleges were empowered to combine their grants and gifts to found (with Government assistance) the agricultural college at Palmerston North.

In the early 1930's plant and soil research was well organised with efficient extension services, but animal research had lagged somewhat behind. In 1939 an Animal Research Division was added to the Department of Agriculture, and Wallaceville and Ruakura were made the principal animal research stations.

By the end of the period research and extension were beginning to reach the stage of organisation and achievement warranted by the importance of the farming industry. Their efficiency in improving the practice of farming had been proved; dairying and animal husbandry, crop and pasture production, fruit, vegetables, and other subsidiary industries had all benefited, and research and extension workers had gained for themselves a definite place in the agricultural organisation of the country.

Possibly during latter years more emphasis has been given to research than to extension, and the problem of the future may well be to keep the correct balance, not only in active work but also in the training of the men who intend to enter either the extension or the research services.

Soil Fertility

In concluding this summary of New Zealand's farming history, it is proper to consider whether in the period the country's soils have been improved in fertility or impoverished, for the continued prosperity of the nation depends on the adoption of farming systems which maintain soil fertility.

The past hundred years, which cover the country's farming history, show the development of a world trade in foodstuffs; cheap food and raw materials from the lands of the New World were exchanged for manufactured goods, and New Zealand developed as a larder of industrial England. Peace and the maintenance of soil fertility were essential for the continued success of the system, and neither has been realised fully. Whether food is cheap or dear can be assessed only when all reckonings are made, and for the products of the soil the book-keeper should make his assessments not only for a season but for decades and centuries. To allow so much for rent, so much for labour, and so much for interest or profit is valid only if the system of production provides for the maintenance of soil fertility, for soils are not machines which may be readily scrapped and replaced when worn out.

Initially the cheap cereals and meat, the wool and hides, the sugar and rubber which were essential to

Better LINSEED

. . . the earlier the Land is ploughed for Linseed the better the Crop . . .

Plough as Soon As You Can for... SPRING SOWING!

Consult your Merchant . . .

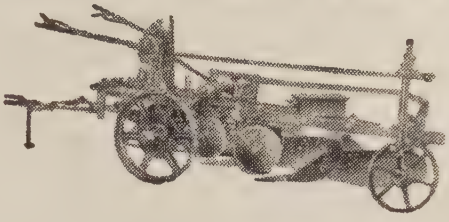
or our Field Representatives for advice and book your seed requirements early, as only limited quantities of some varieties will be available next Spring.

DOMINION INDUSTRIES LTD.,
P.O. BOX 1168 - - - CHRISTCHURCH
TELEPHONE 31-840.

---

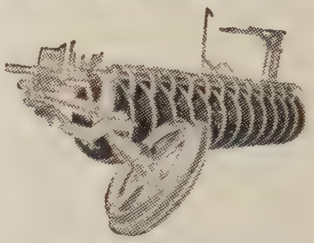
2 MASSEY-HARRIS

1948 CULTIVATION WINNERS



SUNBEAM PLOUGH

—with the famous Murray Power Lift, which lifts on all three wheels! Fully welded in high tensile steel . . . extra high clearance for all ground contours . . . a truly life-time production!



ONE-WAY DISC

—by far the most popular tiller and weed killer! Has balanced 3-point suspension; floating and automatic flexible hitch; quick-action power lift and convenient depth control. *This equipment ensures satisfaction, at less cost with a minimum of labour.*

MASSEY-HARRIS Co. Ltd.

(In Association with P. & D. Duncan Ltd.)
Head Office: CHRISTCHURCH.
Branches at: AUCKLAND, PALMERSTON NORTH, and DUNEDIN.
AGENTS EVERYWHERE.

THE SERVICE ARM OF THE N.Z. FARM

SEED PEA CONTRACTS

Yates are now arranging for next season— see our representatives early.

Grow Peas that suit your land—our experts will advise the right variety. Sow seed produced by a New Zealand Seed Firm for New Zealand conditions — maximum yields. Highest prices and an assured market — no gamble — prompt payout. Experienced advice and assistance from New Zealand's leading SEED FIRM — we specialise. Ask the successful growers in your district who grow for Yates regularly.

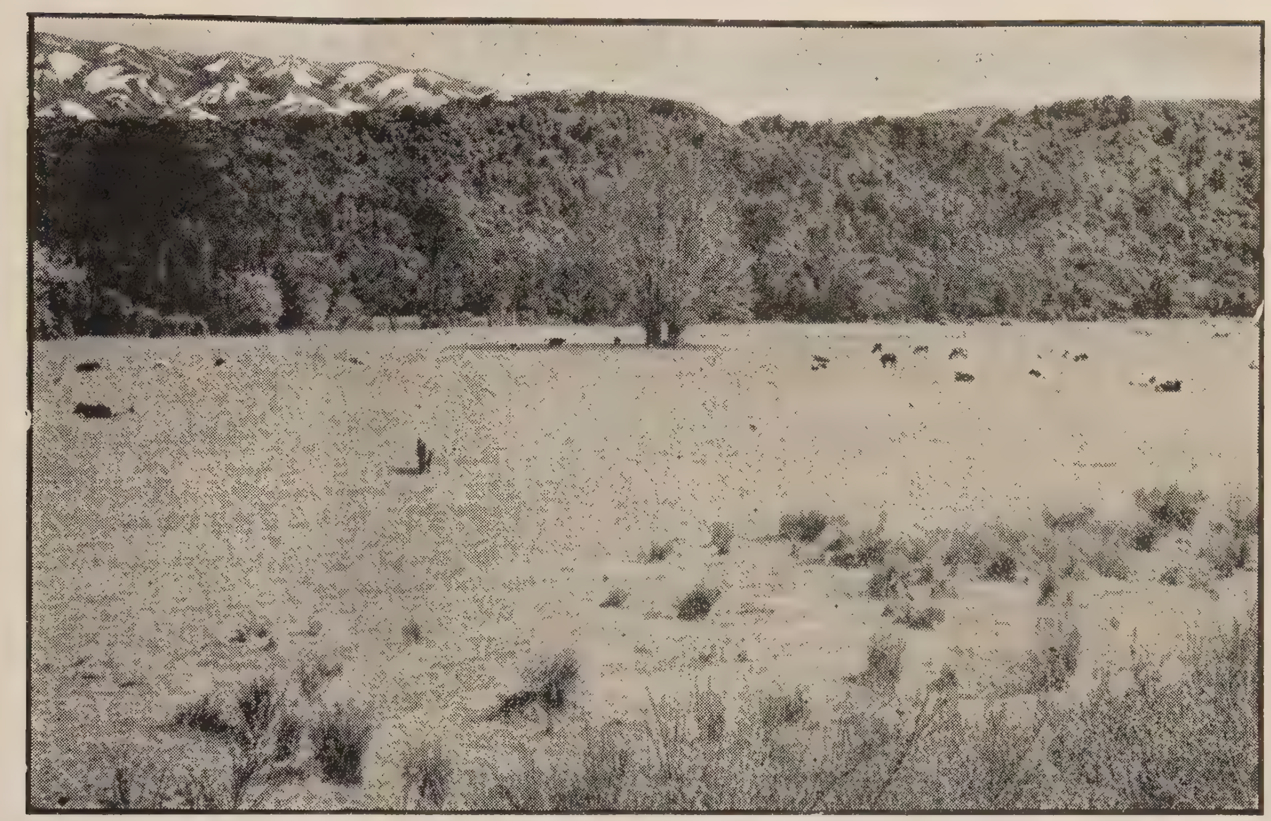
By producing Peas you'll be improving your land and producing valuable seed for New Zealand and Overseas' needs.

Arthur Yates & Co. Ltd.

AUCKLAND and CHRISTCHURCH

See your nearest representative early—

AUCKLAND: Head Office. Box 1109.
GISBORNE: Common Shelton & Co., Ltd.
HASTINGS: Turners (H.B.) Ltd.
BLENHEIM: A. Yates & Co., Ltd., Branch Office.
CHRISTCHURCH: A. Yates & Co., Ltd., Manchester Street.
OTAGO: Chas. E. Wallington, Omakau (phone 6K); alternative address: 19 Granville Terrace, Belle Knows, Dunedin. Phone 21-746.
SOUTHLAND & WAKATIPU: D. W. Thompson, Queenstown. Box 91. Tel, 42M.



[*Public Works Department photo.*

A contrast in soil fertility maintenance. The decline in fertility over large areas of surface-sown hill country because of erosion can be overcome only by the use there of the improved grassland farming practices evolved on the plains—the more widespread use of fertilisers, the introduction of clovers into the pasture swards, closer subdivisional fencing, and a higher ratio of cattle to sheep in the grazing management.

countries specialising in industrial development were produced largely through the exploitation of the fertility of new lands. The stored fertility of natural grasslands was used up in continuous cereal production, native pastures were deteriorated through burning and overstocking, and low-paid coolie labour, whose use often induced insoluble social problems, provided the basis of cheap tropical products. Only during the past two or three decades has the real cost of much of this "cheap" food been realised, and then only because soil erosion and deterioration have reached in certain places so advanced a stage that the remedy is difficult. War and famine have threatened the foundations of international trade, and real recovery to bring peace and plenty must be based on sound systems of farming, or there will be no permanence of either peace or plenty.

Early farming in New Zealand naturally followed the conventional lines of exploiting the natural resources of the country, for if farmers had not done so the country would not have been quickly settled and developed. First the natural tussock grasslands and then the bushlands were used for extensive pastoral farming, and not until meat and dairy produce became important exports did soil-fertility improvement on the flat and undulating lands more than balance any gradual deterioration of the hill-country pastoral areas. Of the 43 million acres of occupied land in New Zealand, only on about six or seven million acres, comprising the flat and undulating land, is the fertility level being raised, while on much of the twelve million acres of tussock and ten million acres of surface-sown land fertility is not improving.

The past and possible future decline in fertility on these large pastoral areas is a reality which will not allow itself to be ignored. Over large areas the circumstances leading to the general decline in fertility are beyond the immediate control of many of the occupiers. On the surface-sown hill country the more widespread use of fertilisers, fencing, and cattle is necessary to maintain and improve soil fertility and carrying capacity. On the tussock grasslands fencing, spelling, and the destruction of rabbits, though immediately necessary, must be accompanied by research aimed at finding methods for the creation of a pasture sward more suitable than the native tussock for continuous pastoral usage.

These works will be costly in labour and materials, and the necessary expenditure balanced against immediate income may not show a profit if measured by orthodox book-keeping, but they will be nationally necessary if the value of a productive and fertility-maintaining system of farming is balanced against the future needs of the country.

The science and practice of grass farming evolved on the plains of the Dominion must be carried to the hills, even at a great apparent cost, if a permanently-productive farming industry is to be a reality of the future.

References

"A History of the New Zealand Dairy Industry"—Philpott.

"The Dairy Industry in New Zealand"—Hamilton.

Annual reports, Department of Agriculture.

Annual reports, Marketing Department.

Agricultural and Pastoral Statistics.

Statistical Report of the Sheep Farming Industry of New Zealand, Department of Agriculture.

Abstract of Statistics.

Report of the Dairy Industry Commission.

Agricultural Organisation in New Zealand—Belshaw, Williams, and Stephens.

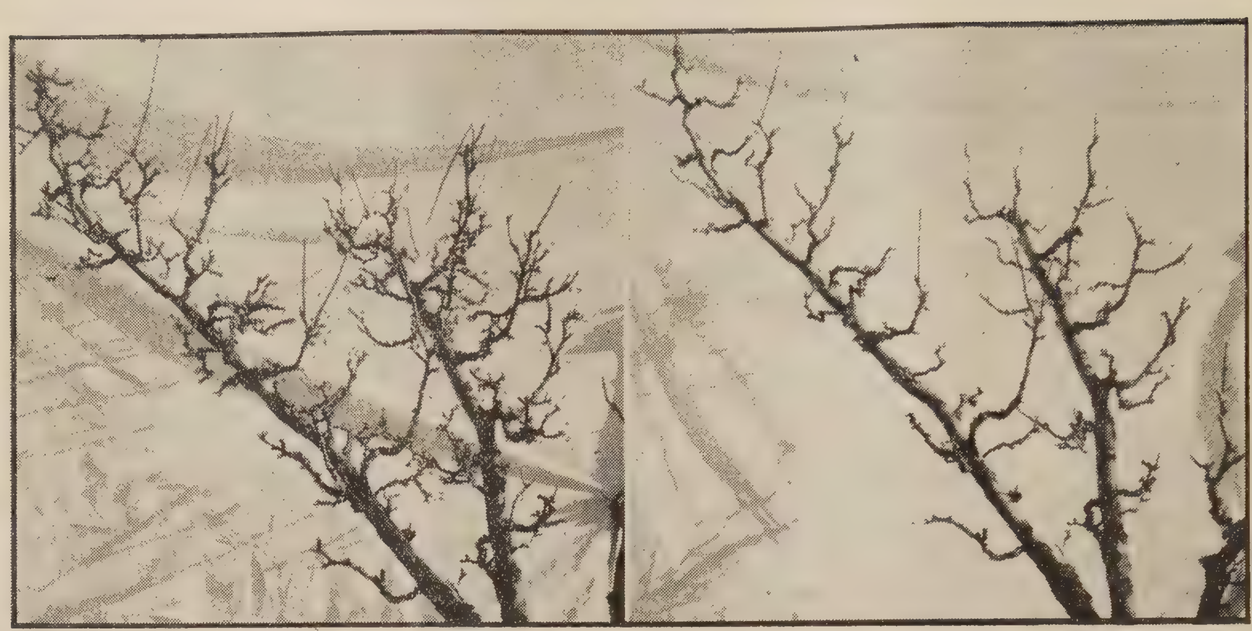
"New Zealand Journal of Agriculture."

"New Zealand Wheat Review."

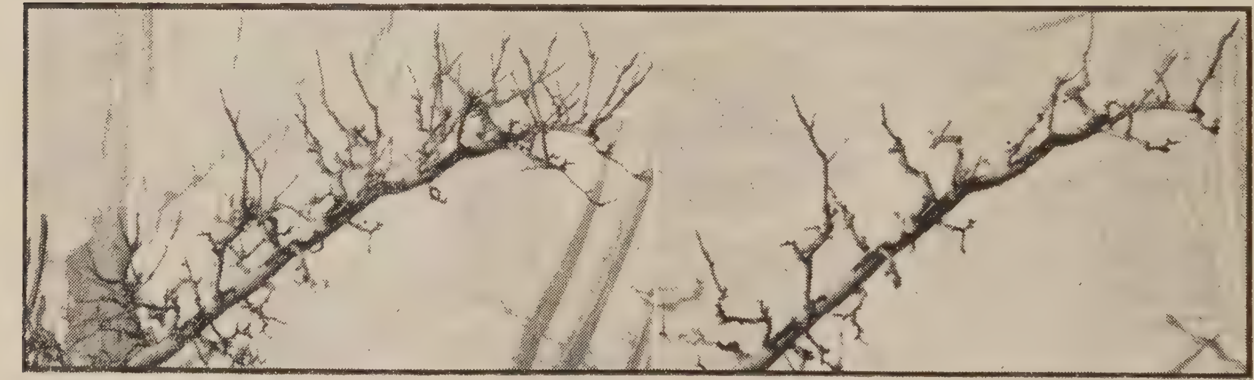
Report of the Pastoral Lands Commission.

New Zealand Official Year-books.

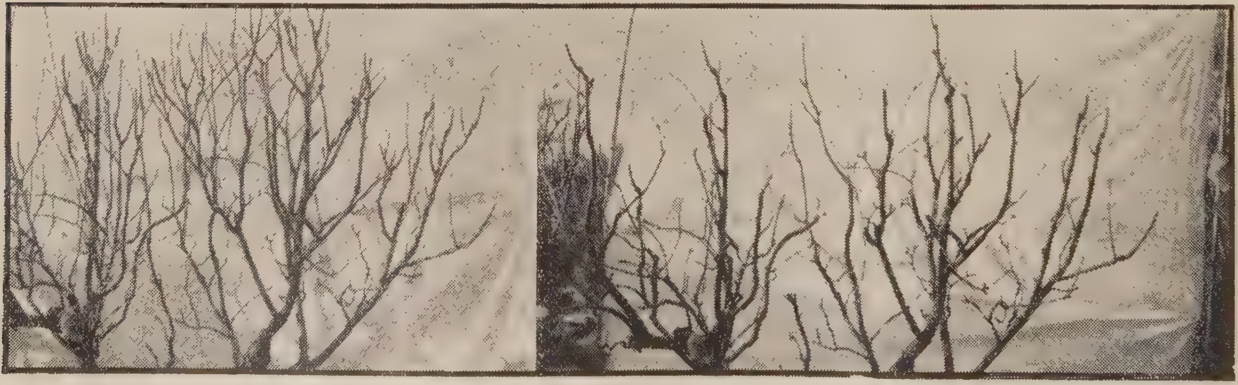
SPUR PRUNING OF FRUIT TREES



Left—A Sturmer apple tree pruned too lightly, leaving too many fruit spurs. Right—The same tree with laterals and spurs thinned out as recommended on the opposite page.



Left—This Delicious apple tree trained on the semi-cordon principle is carrying too many laterals. On the right the leader has been spur pruned to space the laterals to the advantage of the tree and the crop.



An Irish Peach apple tree. On the left it is shown before spur pruning, with far too dense growth. On the right it is shown with laterals and leaders more advantageously spaced.

SPUR PRUNING OF FRUIT TREES

SPUR pruning, though only a single phase of the pruning of fruit trees, which is a necessary operation of fruit growing, if understood fully and carried out according to the recommendations in this article by A. R. Grainger, Fruit Standardisation Officer, Wellington, is likely to be of considerable assistance to the farmer or domestic orchardist who has a few trees which have been bearing for a number of years.

THERE appears to be a natural tendency for the novice in pruning to cut too lightly when dealing with bearing fruit trees, in the mistaken belief that removal of wood means a reduction of the crop. As a result within a few years most kinds and many varieties of fruit trees develop too many spurs which bear heavy crops of fruit lacking in size but which have a devitalising effect on the trees, resulting in a cessation of wood growth and a progressive weakening of the tree.

Weak Spurs, Small Fruit

In some instances the multiplicity of fruit spurs which develop become individually weak and, though they continue to blossom freely, fail to set fruit. This often happens with Winter Nelis pears. In other cases, such as the Sturmer apple, the spurs continue to bear freely, but the fruit fails to size up satisfactorily and the bearing of heavy crops results in a stagnation of growth. Plums, also, particularly those of the Burbank type which often carry too many old spurs, soon show the effect in smaller fruit.

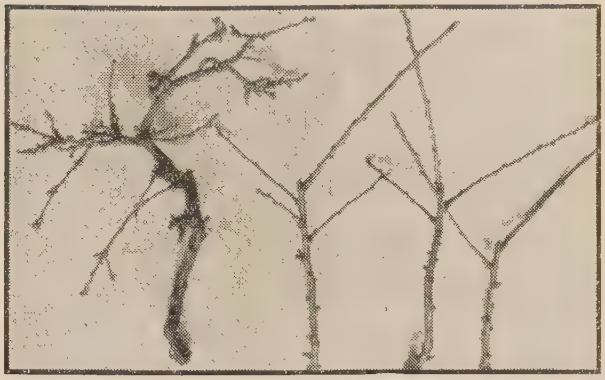
Disease Control Difficult

Apart from the production of smaller fruit, another disadvantage of dense, over-spurred trees is that disease control is made more difficult, the application of spraying material being less efficient, while the lack of light and sunshine in this type of tree results in poorly-coloured, low-quality fruit.

More drastic thinning out of fruiting wood on the average domestic orchard tree is therefore recommended. This does not mean that all laterals should be stubbed back short, but rather that they should be spaced out sufficiently to permit the entry of adequate light.

Careful Thinning Out of Wood

Even if the tree owner has little fundamental knowledge of pruning, he may carry out much good work on these old trees if he pays attention to careful thinning out of the wood. The three sets of before and after spur pruning illustrations on the opposite page give a good indication of the degree of thinning out required. In each case the branch or branches shown on the left were regarded by the owner as pruned, and on the right the spacing out recommended is illustrated.



[*Green and Hahn Ltd. photo.*

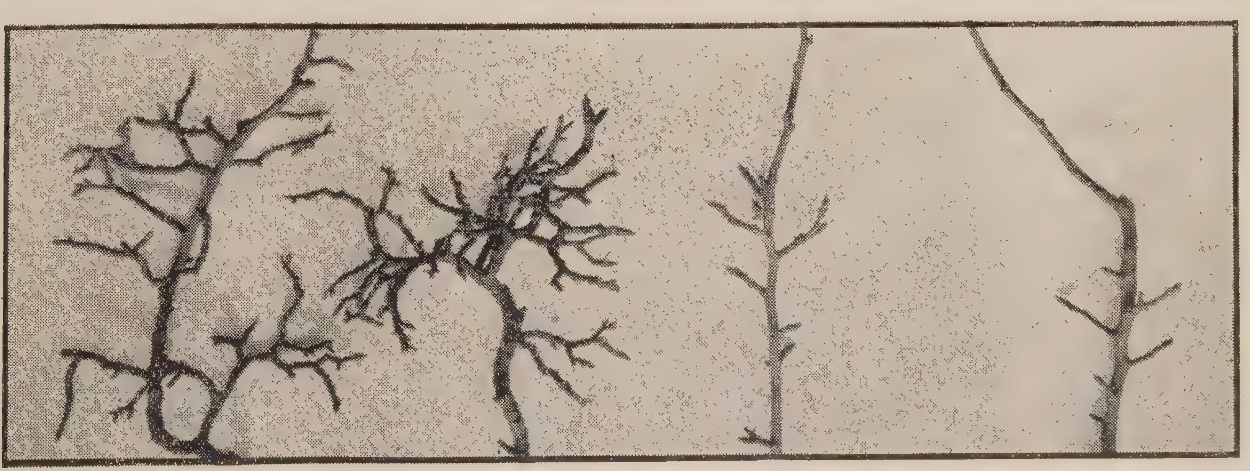
Declining fruit spurs of Burbank plum shown on left should be removed in favour of young, vigorous types on right.

In thinning out, wood and spurs that are weak, aged, or diseased (for example, apple wood infected with powdery mildew) should first be selected for removal, but when a good tree has become too dense much healthy wood may also have to be removed.

If trees, besides being too dense, are too high, the leading growths may be sawn off, preferably just above a more horizontal shoot (lateral) at a height which will allow spraying to be carried out efficiently.

Saves Fruit-thinning Work

Even in commercial orchards where trees have been pruned regularly by experienced growers some varieties gradually reach a stage when they have too many fruit spurs. If these are all allowed to remain, the heavy crop that sets necessitates a great deal of thinning in spring when the grower has other urgent work requiring his attention and most growers prefer to do the necessary work, or a great deal of it, at pruning time. However, with trees that fluctuate somewhat in their bearing habits the most suitable year for the grower to carry out heavy spur pruning is when the heaviest crop is promising, as there is then generally still sufficient fruiting wood left to ensure a good crop, while the work at fruit-thinning time is considerably lightened.



[*Green and Hahn Ltd. photo.*

The types of Winter Nelis fruiting wood on the left are undesirable and should be removed in favour of those on the right.

Feeding Cows to Avoid Milk Fever and its Complications

A MARKED seasonal variation occurs in the incidence of milk fever and its complications grass staggers and acidosis. This article by J. C. Gerring, Veterinarian, Department of Agriculture, Hamilton, shows that these diseases are closely associated with the feed conditions at and for some weeks after calving. Serious losses occur in certain seasons, and it is maintained that they can be largely avoided by providing ample feed for this critical time of the year.

ONE morning last spring a Waikato farmer found nine of his cows down, all within 48 hours of calving. Fortunately, with suitable treatment they all recovered. These were typical uncomplicated cases of milk fever. In 1945 this farmer was not so fortunate. Cows went down a week to six weeks after calving and most of them resisted treatment, some of them dying in a fit. These were complicated cases of grass staggers and acidosis.

How can this seasonal difference be accounted for? A mild winter in 1947 was followed by a good growth in the early spring, good supplies of hay were still on hand, and production in the first few months was well above average. In 1945, on the other hand, a long, cold winter was followed by a late spring, hay and silage supplies were exhausted, cows continued to lose condition after calving, and production figures dropped below average.

This striking fluctuation in the availability of spring feed is characteristic of grassland farming, which depends on the vagaries of the climate. Farmers must adopt measures that will tide them over such contingencies to avoid losses cause by complicated cases of grass staggers and acidosis.

Fluctuation of Pasture Growth

Obviously, considerable yearly variation exists in the growth of pasture, but in general grass begins to grow vigorously in the spring, growth rising to a peak in October-November. It then falls away sharply in December-January with the onset of dry summer weather, and rises again with the autumn rains. A low level is maintained in the winter months, growth seldom being entirely dormant.

How this fits in with the food requirements of the dairy cow is illustrated in the accompanying graph. The food available is that of an average season. Even under those conditions, when grass alone is depended on, the feed available is inadequate for the cow's requirements during July and August. When pasture growth is later than normal, as occurred in 1945, this discrepancy is accentuated, the shortage continuing into September. The extent to which provision is made for such an adverse season is a measure of the efficiency of a grassland farmer.

Hay and Silage

The graph also shows a surplus over feed requirements in late spring and again in autumn. The late spring supplies of grass must be utilised by making hay and silage to provide for the periods of deficiency. Farmers stocking to capacity should shut up 30 to 40 per cent. of their farms for this purpose. In practice the average farmer uses only half this area, but experience has shown that farmers who save adequate hay and feed it liberally during the early part of the milking season have least trouble from milk fever and its complications.

Growth surplus to requirements in the autumn should be kept in "cold storage" by closing paddocks during March or April, the saved grass being rationed to the milking cows in late winter and early spring, in conjunction with hay and silage. This is another guarantee against a period of short supply.

On less-improved farms there is much to be said for a small area of roots to feed to cows after calving, though the daily supply may be no more than 20 to 30lb. a head.

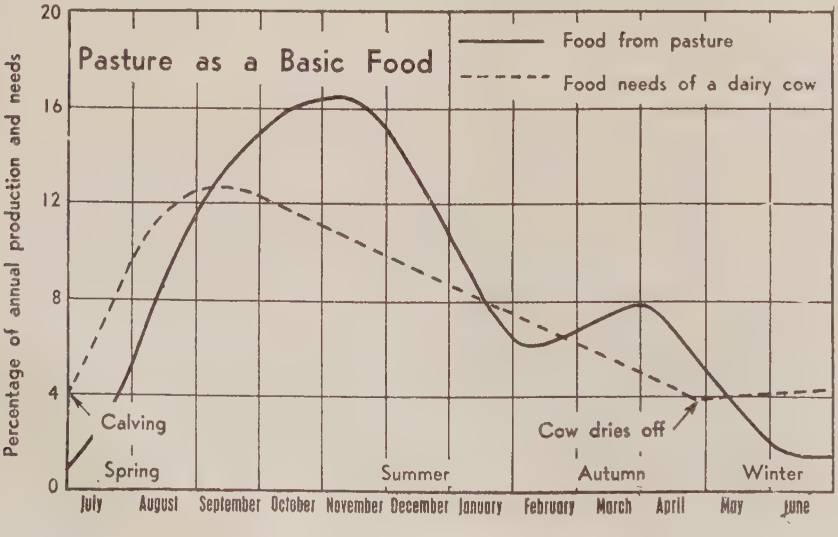
With ample feed available, cows should be brought through the winter on a gradually-rising plane of nutrition. A week before calving they should be placed in a relatively-bare but well-sheltered paddock and fed all the hay they will eat. It is wise to keep the best-quality hay for this time of the year. Cows should be maintained under these conditions for three or four days after calving to give them time to settle down. This practice will reduce to a minimum cases of uncomplicated milk fever.

Supplementary feeding with hay should continue until the spring growth comes away and matures—that is, when it is 4 to 5in. high. Lush, immature grass alone is insufficient to maintain cows in good bodily condition as well as providing for high production. By balancing up this pasture, hay will do much to prevent complicated cases of milk fever.

Value of Molasses

Most farmers are aware of the value of molasses in preventing these diseases. That is the result of the feed value in molasses rather than of any special medicinal virtue. As a feed, molasses is costly compared with hay, and on those grounds should not be considered as a substitute. However, if supplies of hay are short, feeding ½lb. of molasses a cow daily will help to increase the feed intake and so reduce losses caused by grass staggers and acidosis.

Farmers must appreciate how constant are the yearly food requirements of their dairy cows and how variable is the feed position from season to season. Making provision for the adverse season is the best assurance against losses from these diseases.



Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in July as under:—

Auckland—1YA, on July 27, at 12.35 p.m., "Cropping for Pigs," by H. E. Clark, Supervisor, Auckland District Pig Council.

Wellington—2YA, on July 15, at 12.35 p.m., "Labour and Feed Saved—Some Examples of Good Piggeries," by I. H. Owtram, Supervisor, Taranaki District Pig Council.

Christchurch—3YA, on July 19, at 12.35 p.m., "Answering Questions in this Month's Mail," by H. W. McIntosh, Supervisor, Canterbury District Pig Council.

Control of Manuka in the King Country

[H. Senior Clegg photo.

In the King Country manuka and other secondary growth can be kept in check by the introduction of clovers followed by the use of phosphatic fertilisers.

THE portion of the King Country particularly subject to invasion by manuka is bounded on the east by the good clean hills of the Taihape district, on the west by the fertile dairying district of Taranaki, and on the south by a fertile coastal plain strip. The northern King Country, centred on Te Kuiti, is not particularly subject to infestation, and not until the Taumarunui district is reached is the manuka problem acute. E. G. Stainton, Fields Instructor, Taumarunui, describes how one farmer in the Kaitieke Valley has overcome the problem.

THIS large area of land subject to manuka infestation was heavily forested. In 1905 land settlement and sawmilling began with the approach of the main trunk railway. After most of the heavy trees had been milled, the light timber and underscrub were felled and burnt and grass and clover seeds sown in the ash. The resultant pastures were highly productive for a time, but as the fertility leached away they degenerated. With the weakening of the pasture sward, second growth, including manuka, appeared over much of the country and replaced the pastures. Settlers were driven from their holdings by the heavy infestation of their pastures with manuka.

Natural grassland occurs mainly in areas of low rainfall, while where the rainfall is great forest or scrub forms the natural vegetative cover. In New Zealand the white man, by careful management, has been able to replace much of the natural forest with pasture, but in some areas where rainfall is high and soil fertility low the fight has been unequal and second growth has replaced the newly-established pastures. However, invasion by manuka on such country can be prevented and overcome.

Preventing Invasion

To prevent invasion it is essential to grow grasses which cover the ground completely, for manuka seedlings establish most readily in the bare spaces. Where fertility is low, high-producing species will not form a complete cover and it is necessary either to sow species such as browntop and danthonia in the mixture or to raise the fertility of the soil so that the better species will thrive.

Stocking with cattle is important because as they crop the grass they are bound to nip off seedling manuka and damage or destroy the small plants with their hooves. Plants that manage to live and establish can be pulled by hand.

Eradication

Established manuka can be eradicated by cutting it low to the ground. Scattered plants can be dealt with in the following way:—

With two men cutting and one forking, the cut manuka is placed in heaps or windrows 2ft. high; this thickness is necessary to prevent grass growing through the manuka while it is drying, and unless the heaps are large cattle tread among it while foraging for grass and scatter the manuka. It is also necessary to concentrate the manuka in large heaps so that when the material is burnt the seed is destroyed. The burnt patches are resown with grass and clover seed, which germinates and establishes well in the thick ash from the fire. A thin sowing of pasture seeds is also required to strengthen the sward on the area where the manuka was growing. The area requires careful watching for some three or four years for re-establishment of manuka by seedlings, which should be hand pulled as soon as they appear. After that the area will keep fairly clean and only a little attention to seedlings will be required.

On a thickly-infested area the manuka should be left to lie as it is felled and the whole area fired about March and resown with a suitable seed mixture.

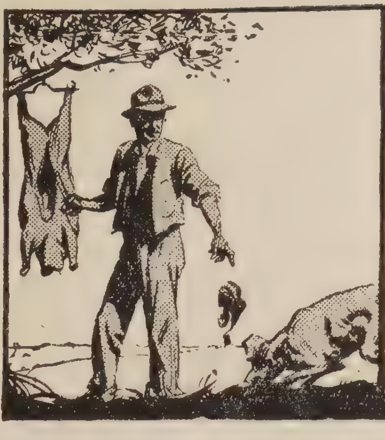
Successful Management

In the portion of the King Country subject to reversion to manuka the climate is fairly mild; only on the hilltops are light falls of snow experienced, and heavy winds strike only exposed positions. In this district, in the Kaitieke Valley, lies the property of 350 acres farmed by Mr. T. H. Crocker—a farm which is a monument to his successful management of this type of country.

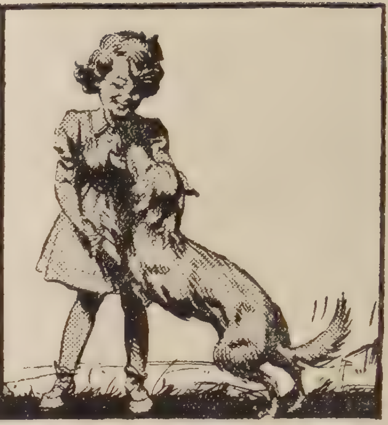
As a young man Mr. Crocker farmed in Canterbury, where he gained considerable experience in crop growing,

Facts for Farmers about HYDATIDS

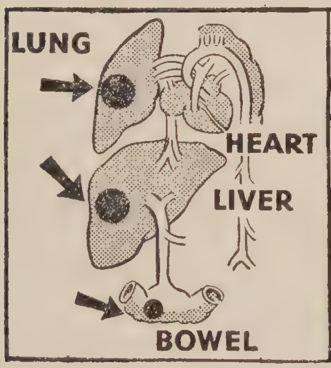
Your faithful friend cannot help being a danger to you and yours if you feed him on raw offal, and neglect to dose him for worms.



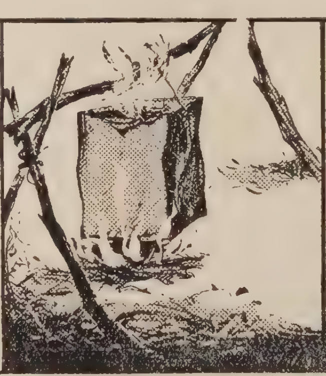
In some districts up to 70 per cent of older sheep are infected; cattle and pigs also. The hydatid cysts (fluid bladders) form usually in liver and lungs. Dogs fed on offal are liable to become infected.



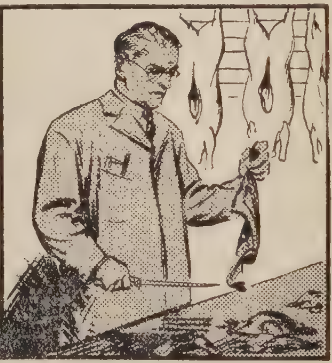
Dogs act as carriers. They do not have cysts but carry the worms, whose eggs are distributed in droppings. This dries and crumbles into dust which is easily picked up on coats of animals.



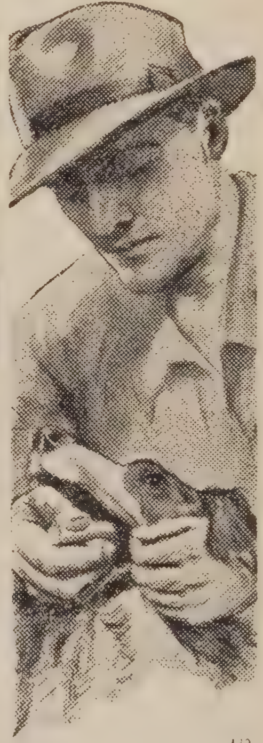
Hydatid eggs get into human body from hands that have touched animal coats, or food polluted with dust. Bloodstream takes eggs to liver, lungs, etc., where they may lodge and grow into large cysts.



Never throw raw offal to dogs. Cut into slices and boil for 10 minutes first, otherwise burn or bury. Children, and all who handle animals, should never put hand to mouth without washing.



N.Z. is losing about £150,000 a year through meat liver rejected because of infection. Stock infect dogs, but dogs reinfect stock. Take precautions. Above all, use arecoline tablets to dose your dogs.



Dose your dogs regularly

Never feed them on raw offal

H2

[*H. Senior Clegg photo.*

Manuka invasion is a constant problem on high-rainfall hill country.

sheep husbandry, and grass-seed production. About 1905 he moved north, stopping in Taihape for two years before buying his present farm. No doubt, like many others, he thought that prospects on his new property were as good as on the hill country of Taihape, where reversion does not occur or is easily controlled. The land was in light bush and scrub. As there were no buildings on the section, tents were pitched and Mr. and Mrs. Crocker and their four young children lived in them during the first winter while a slab whare was being erected.

Before the family was moved on to the farm 50 acres of bush were felled and burnt and the land sown to grass. This was fenced and stocked with sheep and a start made on the felling and grassing of another 70 acres of bush. Each succeeding year for seven years about 40 acres of bush were felled and the land grassed and fenced. In the second year of occupation the settler began milking 30 dairy cows and the farm also carried 100 ewes. From then on the number of sheep carried was gradually increased and the number of dairy cows decreased until dairying was discontinued. In the early years the dairy cows were necessary to produce sufficient income to support the family and pay for the breaking in, but as more land was grassed they could be dispensed with.

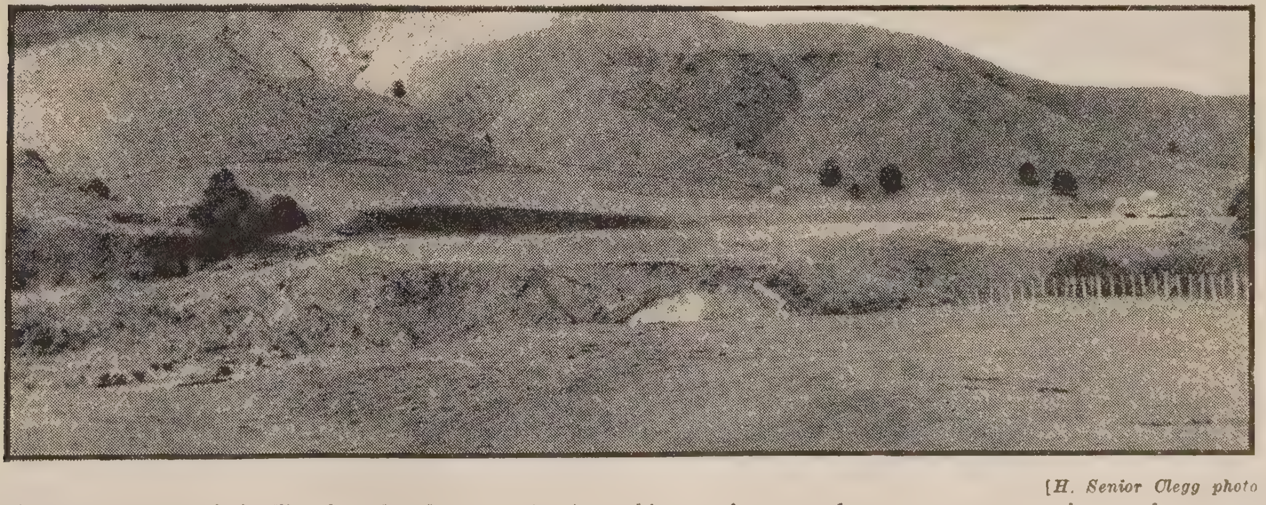
This farm has been sown in pasture and is today in pasture and not in scrub, or even partially in scrub, as are thousands of acres surrounding the property. What is the secret of Mr. Crocker's success where so many have failed?

The property consists of about 60 acres of easy, rolling, pumice land ploughed and grassed, 10 acres of bush for shelter, and 280 acres of moderately-steep sandstone and mudstone country covered with 4 to 6in. of dark brown sandy loam of volcanic origin. The hills were surface sown with the usual mixture of better grasses then sown, which did not include browntop and *Lotus major* until their value was appreciated fully in later years; then they were surface sown and included in mixtures for burns.

Topdressing Policy

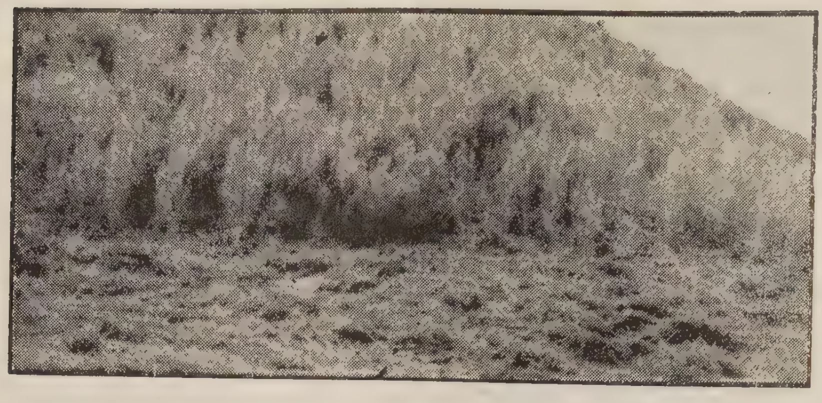
As was common experience in the district, a few years after being sown the pastures began to deteriorate and the stock fell away in condition to such an extent that in late winter many died. After success with the use of phosphatic stock lick, 25 acres of pasture were topdressed with basic slag for two years. That proved so effective in improving the sward and the health of the sheep that in the following year £100, including freight and cartage, was spent on fertilisers. It was then decided to topdress as many paddocks as possible with one bag of fertiliser an acre for three years in succession, and later the policy was adopted of topdressing half of the hilly portion of the farm each year with one bag an acre. Of late years serpentine superphosphate has replaced basic slag.

The topdressing policy and the running of cattle undoubtedly have enabled the farmer to maintain his pastures. He has proved to his satisfaction that to sow good seed on



[*H. Senior Clegg photo*

With the raising of fertility by phosphatic topdressing this one-time manuka country now carries good pastures.



On a thickly-infested area the manuka should be left to lie as it is felled and then fired in the autumn.

second-growth burns without topdressing is waste of money. By topdressing, not only has the sward been maintained, but it is carrying two sheep an acre plus one cattle beast to every four or five acres, which produces a satisfactory living.

The area is subdivided into 14 paddocks of varying sizes and a form of rotational grazing is maintained. Care is taken to see that the pastures are not grazed hard enough to open up the sward to invasion by hard fern and other weeds. To this end swedes were provided and hay is now cut for wintering of the cattle.

Despite careful pasture management, manuka invasions have to be faced on the farm, as it is surrounded by this weed and is no doubt subjected to an annual dressing of the seed. Manuka plants which establish are promptly destroyed by pulling, cutting, and burning, and burns on thin swards are replenished by sowing pasture seed.

Mr. Crocker has proved that the difficult country of Kaitieke County can be farmed by the use of topdressing and correct stocking. If the value of these had been fully realised before the country had gone back too far, the story of the less steep parts of the district which are more accessible to the railway undoubtedly would have been much different.

The cycle has not turned fully yet, and it may not be long before all such land is in fair and stable pasture or put to other productive uses, such as forestry. Certainly production from such land is too valuable to be lost. Many other settlers in the King Country are realising the enhanced value of their land when topdressed and how their many troubles of the past can be overcome by such treatment. Reversion is now no problem on many hills of the King Country which have received dressings of phosphatic fertiliser.

Pasture-seed Mixtures

Browntop and *Lotus major* are needed in pasture-seed mixtures for hill sowing. Those for second-growth burns must be varied to suit the conditions, and consideration must be given to the way the land faces and the grass species, if any, that were growing before the burn.

For shady faces the following mixture has proved suitable:—

	lb. per acre
Crested dogstail	4
Browntop	3
Certified perennial ryegrass	8
Yorkshire fog	4
Danthonia pilosa	1
Certified white clover ..	1
Lotus major	1
Total	22

For drier hills facing the sun the following mixture is recommended:—

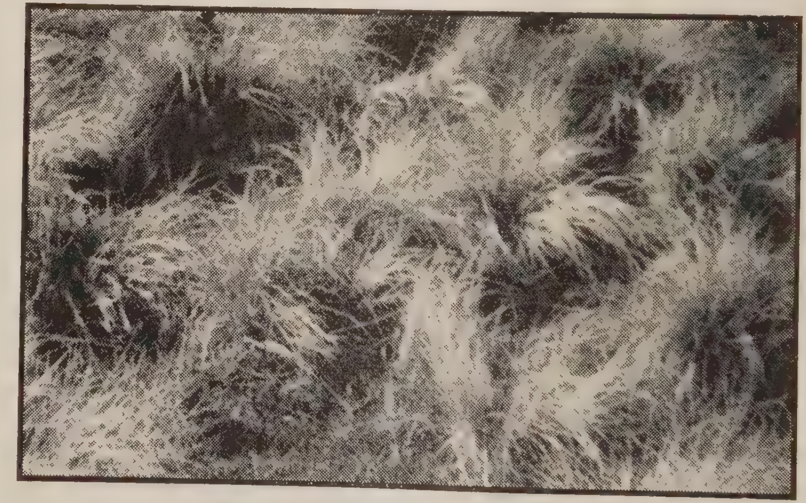
	lb. per acre
Crested dogstail	4
Certified perennial ryegrass	8
Browntop	2
Certified white clover ..	1
Subterranean clover ..	2
Danthonia pilosa	2
Total	19

Up to 8lb. of cocksfoot may be included in either mixture if the ash is plentiful.

Given adequate fertiliser treatment and judicious stocking with cattle, the pastures that establish from such sowings can be kept free from manuka with little difficulty.

◆

Carex comans, a Sedge which is Becoming a Serious Weed in North Taranaki



A SEDGE, *Carex comans*, is causing farmers in Egmont County, North Taranaki, much concern, which is justified in view of the recent rapid spread of the plant in the county.

In appearance the plant is very similar to some of the smaller tussock grasses of the mountainous regions of both islands, but it is a true sedge and not a grass. It is allied to the rushes and grows best under wet conditions. The plant is tough and wiry; even in the young stages it is neglected by stock, and when it is fully grown sheep will starve rather than eat it. It rapidly invades thin and weak pastures on wet land and its spread is favoured by continuous overgrazing, especially by sheep.

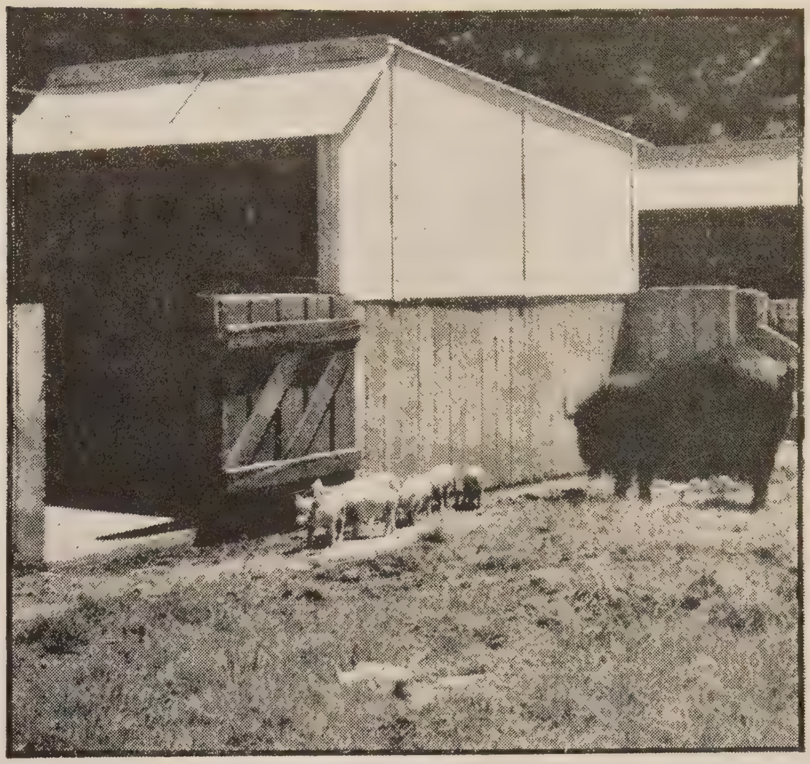
Experiments in the control of this sedge, other than by ploughing, are at present being carried out, and in the near future a more detailed description of the plant, its method of spread, and its control will be given. Preliminary results indicate that, with improved drainage, topdressing to thicken the sward, and spelling to allow the grasses to compete with the sedge offer good prospects of successful eradication and control.

—A. C. BURGESS, *Instructor in Agriculture, New Plymouth.*

IMPORTANCE OF GOOD LITTER PRODUCTION

By A. LONGWILL, *Assistant Superintendent of the Pig Industry, Wellington.*

THAT good litter production is one of the essential foundations of an efficient pig industry has been repeatedly shown in practice. Regular, good litters are the result of the effective combination of a great number of factors which start with the condition of the breeding stock even before mating, affect the critical phase around farrowing time, and culminate in careful weaning to avoid giving a check to the piglets.



Good farrowing quarters are an essential part of sound management. Ability to control the sow and litter is particularly important in winter farrowings.

THE importance of good litter production in sound pig management cannot be too frequently stressed. It is a human tendency to pay greater attention to the fattening pigs, which will soon bring in hard cash, than to the sows and litters. That this is a fundamental mistake has been shown over and over again. The rate of fattening of a pig and its ability to convert its food into flesh of the ideal proportions is largely determined by the time the pig is properly weaned.

On the average it can be safely claimed that if the pig is a 40lb. weaner at 8 weeks, and weaning is carried out so that little or no check takes place, the pig will reach 100lb. live weight at 16 weeks under normal feeding and management. A 30lb. weaner, on the other hand, will reach only about 75lb. in the same time, and will have made less efficient use of its food in relation to live-weight gain.

The former will normally reach 200lb. live weight (the ideal weight to slaughter for production of quality bacon) in 26 weeks or less, whereas the latter under similar management will take about a month longer. The extra food consumption of the slower-growing pig will usually be ¼ to ½ food unit per pound live-weight gain or 50 to 100 food units in total. If this is costed at only 1d. per food unit (although bought foods will average overall at least 2d. per food unit today) and allowance is made for the extra labour in fattening the slower-growing pig, it will be seen that there is a very good chance of a net profit of, say, 7s. 6d. a pig in favour of the better weaner.

In view of these facts, reiteration of the essential steps in the regular production of litters of nine or ten pigs averaging 40lb. per pig at 8 weeks is well worth while.

Attention to Management

It will be obvious to the practical man at the outset that the production of good litters depends partly on management and partly on the inherited qualities of his breeding stock. What may not be quite so obvious is how much more practicable it is to secure rapid improvement in results by attention to the management aspects than by anything that can be done in breeding to improve prolificity and milking ability of the sows. That does not mean that efforts to improve breeding qualities should be neglected, but simply that in New Zealand at present management is still the biggest limiting factor in the production from sows.

RECORDS OF 467 LITTERS GROUPED ACCORDING TO TOTAL LITTER WEIGHT AT 8 WEEKS.

Total litter weight at 8 weeks	Number of litters in group	Averages for group.						
		No. of pigs		Per cent. of loss from birth to weaning	Weight (lb.) at			
					3 weeks		8 weeks	
		Born	Reared		Litter	Piglet	Litter	Weaner
401-450lb. ..	19	11.2	10.6	5	132	12.5	422	39.9
351-400lb. ..	38	11.0	9.5	13	120	12.6	374	39.3
301-350lb. ..	76	10.5	9.3	11	98	10.5	328	35.3
251-300lb. ..	105	9.5	7.9	17	87	11.0	274	34.7
201-250lb. ..	101	9.1	6.8	25	78	11.5	218	32.1
151-200lb. ..	82	8.0	5.6	30	59	10.5	178	31.8
101-150lb. ..	46	8.8	4.3	51	41	9.5	126	29.3

The point is illustrated further by the table on this page, which shows the records of 467 litters bred under ordinary New Zealand dairy farm conditions. The litters are classified into seven groups, each covering a range of 50lb. total litter weight at 8 weeks.

The table not only sets a standard of excellence for litter performance (the two top groups could be classified as excellent and each of the others in order very good, good, fair, poor, and unsatisfactory) but indicates the importance of good management of the sow both before and after farrowing.

There is a definite correlation between final litter weight and the number of pigs born. This is largely the result of management at mating and in the early part of pregnancy. However, there is even stronger correlation between the number reared and final litter weight because of heavier losses in the lower-weight groups in spite of the fact that fewer pigs were born in these groups than in those at the top of the table.

This plainly means that some factors have operated throughout, causing greater losses in the lower-weight groups than in the others. Losses in the three lowest groups are serious economically and are caused by stillbirths, overlying, anaemia, scours, accidents, and injuries, most of which are avoidable under good management, as shown by the results obtained in the top groups.

Reducing Losses in Litters

There is strong evidence that stillbirths and overlying can be greatly reduced by better management of the dry sow to ensure strong, active pigs with plenty of "life force" at birth. The birth weights in the litters showing heaviest losses in the table were so low that the weaker pigs were more susceptible to overlying. Not much is known of the actual causes of stillbirths, and many of the piglets which are stillborn are of at least average size for the litter, but the conclusions from practical observation on farms where consistently-good litter numbers are obtained are not inconsistent with what is known to be essential to the production of good individual birth weights—adequate protein-rich diet for the sow in the last month of pregnancy.

Though some variation in the sow's condition is inevitable, extremes must be avoided, the aim being always to keep good hard condition rather than soft fat on the sow. When she is taken away from her litter at weaning time a sow is at her leanest point in the whole breeding cycle. Having lost condition fairly rapidly during suckling, she should be fed to recover condition quickly until she is in good shape again. It will then be sufficient if she holds this condition, increasing in weight only as the litter grows in utero until about a month before farrowing. The feed should then be increased to about 8 food units, which to provide adequate protein should contain not less than 3 gallons of skim-milk or 2lb. of meat meal. The amount of food should be progressively reduced during the last week of pregnancy and on the day before the litter is due only a very light feed of a gallon or so of skim-milk night and morning with free access to drinking water should be allowed. The state of the sow's bowels at this time is most important and a constant watch must be kept to ensure that normality is maintained through the feed rather than by medicines. When green food is scarce and bran, as at present, is unobtainable it is wise to have a bottle of medicinal paraffin handy, as a lubricant of this type is preferable to a purgative.

After-farrowing Management

As immediately before farrowing, feed should be kept at a reduced level

PEDIGREE SOW RECORDS

DURING the three months January-March, 1948, 18 of the 25 litters of pigs recorded were sufficiently good to be included in one of the five grades set out below:—

Grade	Minimum Litter Weight	
	At 3 weeks	At 8 weeks
1	120lb.	360lb.
2	100 ,,	300 ,,
3	90 ,,	270 ,,
4	80 ,,	240 ,,
5	70 ,,	210 ,,

Contributed by the Livestock Division.

Breed Averages for the Period

Breed	No. of Litters Recorded	Litter Weight at		Number of Pigs		Average Weight at	
		3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	3 weeks (lb.)	8 weeks (lb.)
Berkshire ..	20	93.6	261.2	8.8	7.4	12.73	35.53
Large White ..	4	95.0	288.5	9.5	8.0	11.88	36.06

A No. 3 grade is regarded as good, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:

Owner's Name and Address	Herd Book Number of—		Litter Weight at		No. of Pigs		Grade of Litter
	Sire	Sow	3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	
Berkshire							
Pitcaithly, R., Box 67, Eltham	22904	22097	156	376	12	10	1
Pitcaithly, R., Box 67, Eltham	22904	22096	90	225	11	7	4
Rowlands, T. E., Ruthin, R.D. Kaiapoi	21227	22646	87	310	10	8	4
Rowlands, T. E., Ruthin, R.D. Kaiapoi	21227	22154	96	325	9	8	3
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22823	65	140	9	6	
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22822	44	115	8	5	
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22821	47	134	7	6	
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22820	48	145	8	7	
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22819	40	139	7	7	—
Rangitaiki Plains Dairy Co. Pig Farm, Edgecumbe	22974	22818	34	96	5	3	—
Jones, J. H., Selwyn St., Leeston	21411	21857	100	384	10	9	2
Arnott, D. J., Rongotea	23002	22294	113	232	9	8	5
Ayson, W. R., Aparima, R.D. Otautau, Southland ..	22907	22147	108	312	7	6	2
Hepburn, R. K., Manutuke, Gisborne	21250	21118	148	481	14	10	1
Larsen, O. C., Aorangi, R.D. Feilding	23002	20572	172	377	10	10	1
Larsen, O. C., Aorangi, R.D. Feilding	23002	22411	106	316	8	8	2
Larsen, O. C., Aorangi, R.D. Feilding	23002	20566	122	288	9	9	3
Larsen, O. C., Aorangi, R.D. Feilding	19492	22176	90	232	7	6	5
Larsen, O. C., Aorangi, R.D. Feilding	23002	22324	86	210	6	5	5
Quinn, J. E., Kerepehi, R.D. Paeroa	21943	22571	120	386	9	9	1
Large White							
Horsham Downs Pig Club (secretary, C. G. Houltain, Horsham Downs, Hamilton)	5782	6874	65	182	6	6	—
Haydon, G. C., "Silverst," P.B. Greymouth ..	7013	6982	107	213	8	7	5
Johnson, L. A., Box 23, Murchison	7013	7377	97	397	10	10	3
Pukeho Pig Club (secretary, A. M. Standish, Tarata, Inglewood)	7165	6912	111	362	14	9	2
Tamworth							
Whitelock, G. M., Kairanga, R.D. Palmerston North	13345	15671	75	253	11	6	5

The litter weights for K. L. Warburton's sow, number 23025, published in the pedigree sow records in the March issue of the "Journal," should have read 86lb. and 289lb., which gave the litter a grading of 5.

IMPORTANCE OF GOOD LITTER PRODUCTION

This young sow is approaching farrowing in the correct condition. She is carrying good, firm flesh.

for a day or so after farrowing, free access to drinking water being allowed. This will reduce the liability to "milk fever" in the sow and avoid digestive upsets which can very easily give the litter a serious check at a most vulnerable stage. Scours in young piglets under 10 days old is generally caused by wrong feeding of the sow in the first week after farrowing.

Feed should not be stepped up too rapidly. At this stage another advantage of good feeding of the dry sow is apparent: After good preparation of the sow the producer is less likely to be over-anxious and therefore less likely to increase the newly-farrowed sow's feed supply too rapidly. The lightly-fed sow is also less likely to overlie piglets than one which is distressed through overfeeding.

Feed should be carefully increased until at about 3 weeks after farrowing the sow is consuming 6 food units for herself and 1 food unit for each piglet in the litter. This is, of course, merely a guide, success depending on the capacity of the producer to use his judgment as to what gets the best results from each of his sows. Some litters will naturally fossick around for extra feed earlier than others, and by use of the creep the efficient farmer will take full advantage of the "growth force" of the litter at the earliest possible stage. As soon as extra food is being taken through the creep further increase to the sow can be discontinued, unless she is losing too much condition, and the extra food from this stage given to the piglets through the creep.

Care in Creep Feeding

Creep feeding will not achieve the results of which it is capable unless it is carried out with due care and cleanliness. Only very small quantities of food should be put in the separate, small milk and meal troughs and never more milk than the piglets will clean up by the next feed. Until they are actually cleaning up all that is put in for them the milk in the trough should be emptied (it may be put in the sow's trough if clean) and a little fresh milk put in. Regular scrubbing of feeding utensils, including creep troughs, will pay well.

A run-out on good, clean grass should be provided whenever conditions are suitable. If conditions preclude giving the piglets a run-out before they are a week old, it is a good plan to put a cut turf in the pen to enable them to obtain the traces of iron compounds which are essential to prevent anaemia. Under indoor conditions some farmers prefer to use specific dosages of iron and copper compounds which give a high degree of protection.

Castration should be carried out at a convenient time when the litter is from 2 weeks to a month old. The piglets are easily handled then and little check is given, provided the operation is done with skill and cleanliness. This operation should never be left until weaning time, as the greater check involved in late castration would be added to that involved in the loss of the sow's milk.

At weaning less check is given to the piglets by moving the sow and leaving the litter in quarters to which they are accustomed. However, if the sow has lost condition, which is likely, she should not simply be turned out with the boar and other dry sows to contend for herself, but should be given a house to herself and fed well to recover her condition; she should be in rising condition when she goes to the boar three to five days after weaning.

In the production of good litters, as in every other aspect of management, some farmers will lay more emphasis on one point than on others. However, the producer can take a large share of the credit for regular, good litters, and if a farmer cannot regularly get litters which total 300lb. live weight or more at 8 weeks, he should examine his management critically.

◆◆

Organised Tours by Y.F.C. Parties

ORGANISED tours in the winter are an important feature of the activities of Young Farmers' Clubs and have considerable educational value in broadening members' knowledge of New Zealand farming methods and encouraging a national appreciation of agricultural problems and accomplishments. The billeted type of tour, in which members from one district are billeted in the homes of members in the district visited, has become popular in the last two years and has been the means of creating Dominion-wide interest and friendship among clubs.

June is the month when many young farmers find it most convenient to take their holidays and join an organised touring party. There are now seven parties visiting various parts of New Zealand, the tours being as follows: Fifty Central Otago members are visiting Central Hawke's Bay (billeted); a Southern Hawke's Bay party is touring Northland; 30 Nelson members are visiting South Otago (billeted); a large Wanganui party is billeted in North Canterbury; 25 Western Bay of Plenty members are touring Otago and Southland; a Wairarapa party is touring Marlborough, Nelson, Westland, and North Canterbury, and a Poverty Bay party is visiting South Taranaki. In addition, a Manawatu party visited Dunedin, and 47 South Taranaki members visited Nelson (billeted), both these tours taking place in the second half of May. In July a party from South Canterbury propose to visit the Waikato district on a billeted tour, and some districts are already preparing plans for tours in the winter of 1949.

◆◆

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

July 5—"Current Farming Problems," by A. V. Allo, Instructor in Agriculture, Tauranga, and G. L. Banfield, Instructor in Agriculture, Thames.

July 12—"The Inmates and Organisation of the Beehive," by R. S. Walsh, Apiary Instructor, Auckland.

July 19—"Seasonal Trouble in Sheep," by J. C. Gerring, Veterinarian, Department of Agriculture, Hamilton.

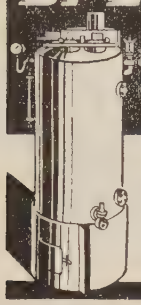
July 26—Young Farmers' Clubs session, by a member of the Western Bay of Plenty Y.F.C. district committee.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.35 p.m. and Thursdays at 7.15 p.m.

Farm news sessions are broadcast over main national stations every Thursday at 9.20 p.m.

◆◆

SPEEDWAY

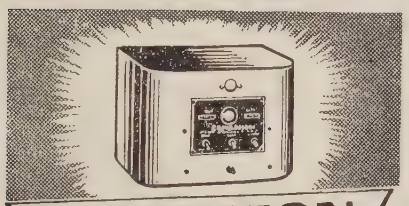


LOW & HIGH PRESSURE
OIL BURNING
BOILERS

Write for free illustrated catalogue to
SPEEDWAY PRODUCTS LTD.
26 Albert St., Auckland
South Island Distributor:
A. H. TURNBULL & CO. LTD.,
Christchurch

5B-1-2

SAVES WIRE!



COMPANION

ELECTRIC FENCE

The Quality Unit with a ONE YEAR GUARANTEE—uses existing wire.
£12.—RAIL OR FREIGHT FREE!
Write for Detailed Leaflet.

JOHNS LTD.

Johns Buildings (P.O. Box 471)
AUCKLAND.

LEADING FARMER SAYS ABOUT—
ELASTRATOR CASTRATION
AND TAILING

"HUMANE"
"QUICKER"
"SAFER"
"NO FLY STRIKE"
"NO SHOCK"
"LAMBS MOTHER-UP AT ONCE"

A BAY OF PLENTY FARMER WRITES:—
"One of the best points about the Elastrator is that it does away with the knife. It cannot be anything like the shock of other methods, as the lambs "mother-up" in a way I have not seen before, and go ahead without check. I do 900 lambs in 5 main drafts. I have had no fly strike. There was doubt about a new method when I bought the Elastrator, but many farmers here use it now and I predict that it will become general. Killing sheets and condition of lambs is a great advertisement for Elastrator."

THIS IS THE MODERN METHOD—

The rubber ring is affixed to the purse, above the testicles. Circulation is stopped. The testicles and purse atrophy and fall off, completing castration.

Get full particulars from your Stock Agent, or direct from

ELASTRATOR CO. LTD., Box 226, Blenheim.

---

why
BARNET
GLASS
INFLATIONS

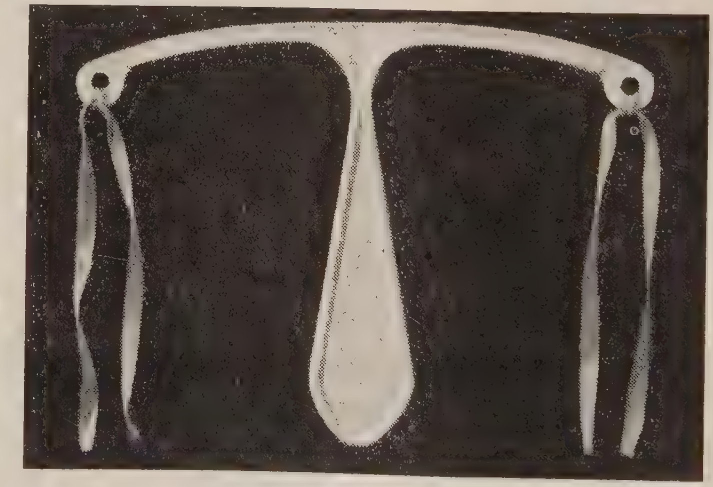
Research has proved that inflations changed every six weeks will help to speed up milking, minimise mastitis, keep up production and maintain milk quality.

More and more farmers are changing to Barnet Glass Inflations because they are back to their high pre-war quality, they are TESTED before leaving the factory, and they cost no more than ordinary inflations.

Ask your supplier for
Barnet Glass Tested Inflations!

Another Dunlop Product

INTRODUCING "SAVEWE"
BEARING RETAINERS *Ready for the coming Lambing Season*



Patent applied for (98755). Design No. 5630.

In the past the annual mortality in ewes suffering from bearing trouble, and carrying mainly twin lambs has been taken for granted. Not so now with the perfection of the "Savewe" a simple but ingenious fitting which enables the bearing to be retained correctly in position after replacement. Packed in a carton containing four.

CHEAP .... EFFICIENT .... HYGIENIC

Apply to The Distributors.
DALGETY & CO. LTD.
(Incorporated in England)
All Branches.
Or any Stock & Station Agent.

CARE OF LIVESTOCK DURING JULY

Contributed by the Animal Research Division.

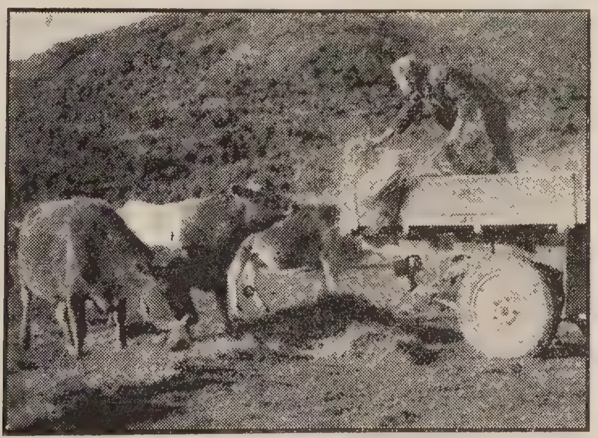
BLOOD POISONING IN EWES AND LAMBS

BLOOD poisoning of sheep is increasing in some districts. Losses are generally most serious in ewes after lambing and in lambs after marking. The disease is often due to the blackleg organism, and a very effective vaccine, which can be obtained through Government veterinarians, is available for preventing it.

* * *

ERGOTISM IN CATTLE

Hay made from ergotised grass will cause lameness and sometimes even loss of feet if fed to cattle. Hay should be inspected for the small black ergots that replace the seeds of ryegrass and other grasses, and if it is heavily ergotised it should not be fed to cattle.



SLEEPY SICKNESS IN EWES

Heavy losses of ewes carrying twin lambs or very large single lambs are sometimes experienced just before lambing. These deaths are caused by ewes' loss of condition during the last few weeks before lambing, and farmers should be sure of feeding their ewes well from now on. If necessary the most forward ewes can be drafted off for special treatment. Good feeding during the last three or four weeks before lambing is absolutely essential.

* * *

DISTEMPER IN DOGS

Dogs can be protected against distemper for life by vaccination, which is best done when the pup is three to four months old, and can be carried out by private veterinary surgeons or club veterinarians. As the vaccine has to be imported, it is necessary to make arrangements at least a month ahead. The availability of this vaccine now leaves no excuse for losing valuable dogs from distemper.

[Sparrow Industrial Pictures Ltd. photo.

VACCINATION OF EWES TO PREVENT PULPY KIDNEY IN YOUNG LAMBS

If losses from pulpy kidney are usually experienced with lambs **under** six weeks old, they may be reduced by vaccinating the ewes a few weeks before lambing. Best results are obtained with ewes that have been previously vaccinated. If pulpy kidney generally occurs in lambs **over** six weeks old, vaccination of ewes is of no value, but vaccination of lambs at marking time may help. A veterinarian should be consulted for further advice.

Sacks and Plaster Used To Make Shed

By A. J. LYNCH, *Assistant Instructor in Agriculture, New Plymouth.*

IN erecting any farm building the aim should be to combine the elements of size, convenience, and permanence with those of simplicity and cheapness. How these features can be incorporated in a building and lend it a particularly neat appearance is shown on the property of Mr. D. Eggleton, Tate Road, Waitara.

THE large shed which he put up measures 18ft. x 30ft. and is built with a gable roof having a 7ft. 6in. stud at the eaves. One end of the shed is partitioned off as a car shed complete with sliding doors, the other section having an 11ft. open doorway to allow the passage of most farm implements. A staging for fertiliser is built at the other end of the structure and a doorway raised 3ft. from ground level gives direct access to it from outside.

Thus the shed lacks nothing in convenience and is sufficiently roomy to house all the implements of a small farm, several tons of fertiliser, and a motor-car.

The plan of the building is well thought out and does not sacrifice convenience for the sake of low expense. In the materials used considerable economy is effected, the walls being of a wooden framework to which is attached a single thickness of sacking plastered with a special cement mixture and reinforced with wire-netting.

Timber for the framework of the shed is mainly 3in. by 2in. *Pinus radiata.* 3in. by 4in. heart timber being used for the wall plates, and 4in. by 2in. heart for the corner studs. Mounted on concrete blocks, this is erected in the normal way; a distance between studs equal to the width of a cement bag must be allowed and the structure should be braced well in every direction. Suitable bags are opened down the sides and tacked over the framework of the walls, flat-headed 1in. nails or clouts being used. The sacks are then painted with the following mixture:—

cement	12lb.
hydraulic lime ..	2lb.
salt	1lb.
alum	½lb.
water ..	1¼ gallons

Before applying the mixture it is advisable to sprinkle the sacking with water, as the mixture will then adhere better and be easier to apply. The mixture is painted on at least three times, the coat being renewed when the first is nearly dry, otherwise it will be more difficult to apply the mixture. The sacking will then tighten and set hard.

Added strength and permanency are given to the walls if 1⅝in. or 2in. mesh wire-netting is tacked on and secured over the treated sacking. It is essential, however, that the wire-netting does not bulge or sag from the sacking and it should be secured in enough places to prevent this, the best plan being to have the netting about ⅛in. from the sacking.

The most satisfactory way to do this is to run the netting around the shed in horizontal strips, straining them tight and tacking them on one above the other. Each length of netting is thus run across the studs, enabling it to be tightly strained and secured at each stud, which would not be possible if it were run up and down the wall. On a building with a 7ft. 6in. wall stud two strips of 3ft. netting and a third length cut down the centre reach from ground level to the eaves, the other half strip being used on the gables, over the doorways, etc. The netting is attached by wiring it through the sacking and stapling it to the studs.

Plaster is applied over the wire-netting to a depth of ¾in. to 1in. and brought to a smooth finish. A rough-cast mixture of a screening of up to ½in. in diameter may be used or, as in this case, a plaster of cement, sand, and screenings of up to ¼in. in diameter. The mixture should be a strong one and of not more than five of aggregate to one of cement. Later the walls are painted, the mixture used being prepared as follows:—

Boil 28lb. of unslaked lime in 6 gallons of water until all lumps are dissolved.

Add 3lb. of mutton fat, 1½ to 2lb. of salt, 1½lb. of yellow ochre, and apply the mixture while it is hot.

With this the shed is given a waterproofing coat and, with cream walls and green facings, looks most attractive. Roofing iron not being procurable at the time, a substitute material was used.

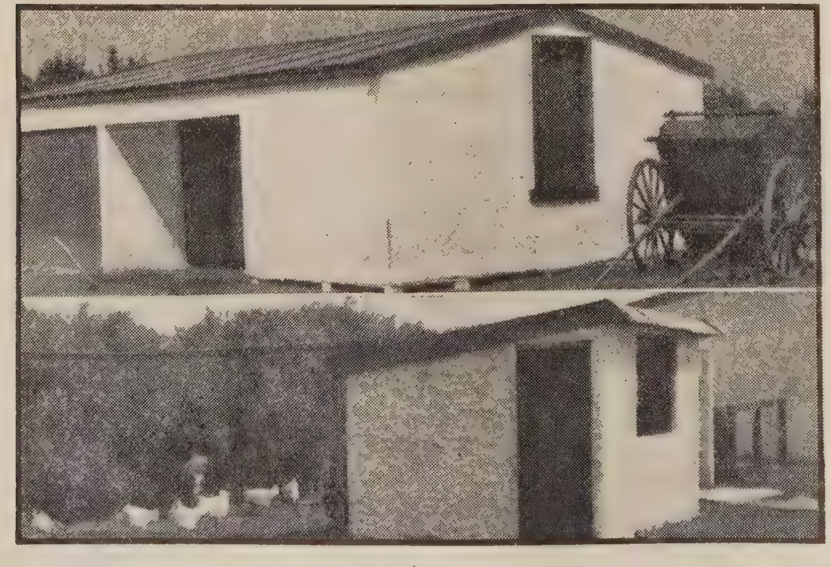
Other Materials Used

Approximate quantities of other materials used were as follows:—

Cement, 9 bags.
Metal, 3 cubic yards.
Timber, 1000 super feet.

The shed was built without assistance, the total cost being only £35, which included £17 for roofing and ridging material. The shed is considered to be most durable and although not resistant to sharp bumps and other abuse, has been built 12 months and is absolutely weather proof. A small fowlhouse with a roughcast finish has been made on the same farm and has given equally-good results.

The method of construction appears to be a useful one for many farms, particularly as the work can be done by the farmer himself with little expense, even for a large building.



Attractive farm buildings made by the method described. Upper—Combined implement shed and garage. Lower—Roughcast fowlhouse.

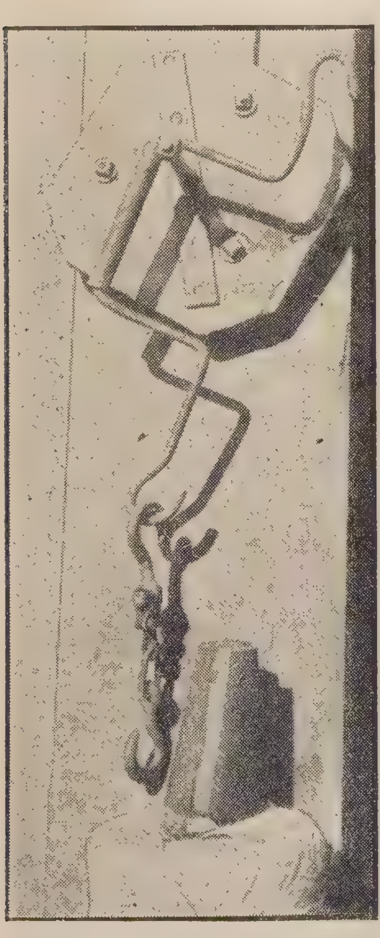
Home-made Rope Maker One of the Most Useful Gadgets on the Farm

By H. A. ARTHUR, *Department of Agriculture, Timaru.*

A FARMER making the simply-constructed and easily-operated rope maker described in this article is likely to find it one of the most useful gadgets on his farm. By its use spare balls and odd lengths of binder twine can be turned into rope, which has innumerable uses on any farm.

EVERY year a considerable quantity of binder twine is wasted. The few balls usually left after harvesting is finished are often left lying on granary and implement shed floors, where contact with lime and fertiliser usually renders them unfit for further use. By using a home-made rope maker twine that would otherwise be wasted can be made into rope suitable for a multiplicity of farm uses, from leg ropes to heavy towing ropes.

The rope-making outfit illustrated consists of the following parts:—



Rope-making equipment. Base board with turning handle attached, brace, swivel, spacer, and ball of twine.

Completed rope with the end whipped to prevent unravelling and to facilitate threading through block and tackle.

1. **A device for twisting the separate strands of twine into three twists.** The base is a board 3ft. long by 15in. wide and 1½in. thick. The three cranks are made of 5/16in. link iron. It is an advantage if the piece of timber 15in. square by 1½in. thick to which a handle is bolted in the centre is made circular.
2. **A spacer to keep the three strands separated.** This is made from a piece of 4in. x 4in. x 6in. totara rounded and tapered at one end and with three grooves gouged down its length.
3. **A brace and swivel.** The brace is made from a length of ½in. or ¾in. round iron with a piece of pipe for the hand grip. Both ends are slightly tapered off and turned back into hooks, one end to take the strands of twine and the other to take the swivel on to which the weight is fixed.
4. **A weight,** which may be a bag of chaff or anything which will give a steady resistance.

The Twisting Mechanism

A good, tough-grained piece of timber 4ft. 3in. long by 15in. wide and 1½in. thick should be selected for the base board of the twisting mechanism, and a piece 15in. long cut off one end to make the turning handle.

In the centre of the base board draw a circle with a diameter of 12in. and with a protractor mark three equal segments 120 degrees on the circumference of the circle. At the three points of the circumference cut by the segments 5/16in. holes are drilled to take the twisting cranks.

After a circle 12in. in diameter has been drawn centred on the 15in. square piece of timber it should be divided with the protractor into three equal segments and holes bored at the three points where the segments cut the circumference.

A handle will now have to be fitted to the centre of the board and the corners rounded off to make a neat, circular unit.

The turning or twisting cranks are made from three lengths of 5/16in. link iron about 11in. long. Three inches from one end a 90 degree bend is made, and about 4in. further on another 90 degree bend. A thread is run on the short end and the three short ends of the cranks are put through the holes in the round board and nuts and washers screwed on the threads. The long ends are put through the holes in the base board and hooks turned back on the long ends of the cranks. This completes the turning apparatus.

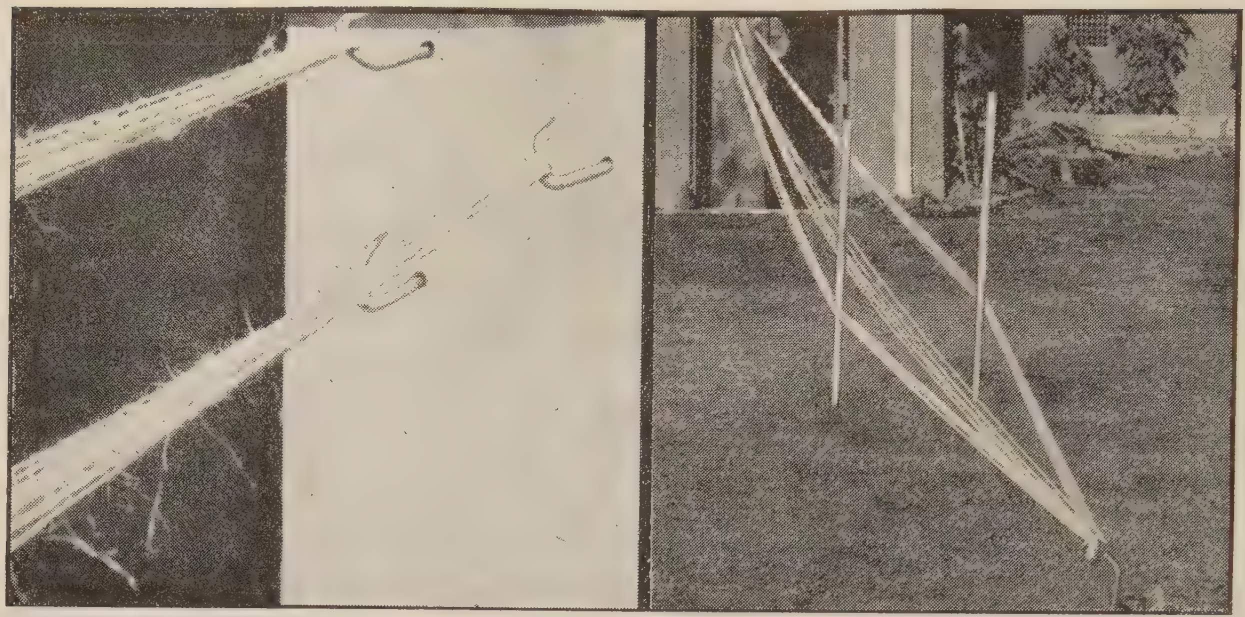
The Spacer

To make the spacer a piece of 4in. x 4in. totara 6in. long is rounded and tapered down at one end to about 2in. Using the previous method, mark three equally-distant points on the top and bottom of the block and gouge three grooves about ½in. deep from top to bottom to take the three sets of twisted twine.

The Brace

The brace may be very simply made from any spare round iron or steel. A short length of pipe makes a good hand grip and an old swivel from a plough chain is all that is required to complete the outfit.

MAKING ROPE WITH A HOME-MADE ROPE MAKER



Left—The three lots of eight strands of twine attached to the hooks of the twisting handle, which protrude through the base board. Right—The base board set up with three sets of eight strands of twine run out to the brace, which is attached to a weight by the swivel. Two smooth sticks ofwood driven into the ground keep the sets of strands separated during twisting.

Making Rope

To make rope the twisting unit should be attached to a five-bar gate so that the cranks run freely between the two top bars. To a bag of chaff or other suitable weight a little further away from the twisting unit than the length of rope required the brace is then attached with the swivel between the brace and weight.

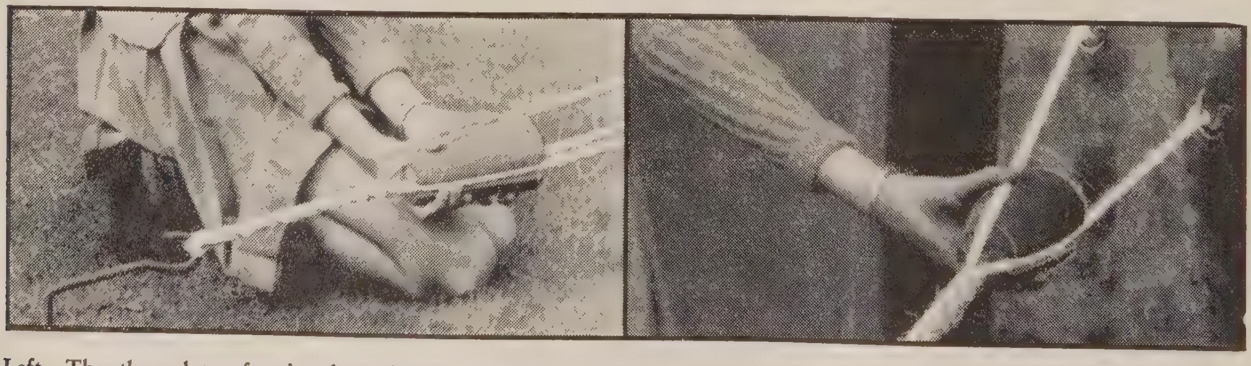
As many strands of twine as are required are then run out from each of the hooks of the twister to the brace, the best method being to attach an end of twine to a hook and then loop backward and forward from hook to brace until the required number is on each hook. Care is required to see that all the strands are of equal tension, as a loose strand will make the finished rope ridgy. Eight strands on each hook will make a hard rope of 2in. circumference.

With three sets of eight strands of twine connecting the twister and the brace, the next operation is to twist the eight strands into a hard cord by turning the handle of the twister in a clockwise direction. (It may be necessary to place some smooth sticks of wood between the three strands as the twisting proceeds to keep them from fouling one another and twisting together.) Care should be taken to see that the twist is even along the whole length of the three strands; if it is not the rope will be softer at one end than the other. When the strands are twisted into three firm cords the spacer is inserted next to the brace.

For the final operation two assistants are required, one to hold the spacer and allow it to be forced gradually in from the forming rope and the other to turn the brace. When everything is ready the brace and twister are turned in the same direction and at equal speed and the forming rope forces the spacer along the strands. All the operator has to do is to prevent the spacer from revolving.

When the formed rope is detached from the twister and brace each end should be made secure from unravelling either by back-splicing a rose or whipping with seaming twine. New rope is inclined to kink up when first taken off the machine, but if, starting at one end, the loops are thrown out until the rope lies straight on the ground, it will give no more trouble.

A rope newly made from binder twine is inclined to be fairly "hairy," and it is a good idea before detaching it from the twister and brace to carry along beneath it, say on a long-handled shovel, a piece of ignited kerosene-soaked rag to singe the rope clean.



Left—The three lots of twine have been twisted into three tight strands, the spacer inserted, and the rope begun. Right—The rope almost completed, the spacer has been forced almost to the base board.

GROWING TULIPS FOR PLEASURE AND PROFIT

TULIPS can be relied on to give a fine display each spring, but too few gardeners take full advantage of the range of colour and varieties now available. Though it has been said that "those who grow tulips die violent deaths," the great popularity of these flowering bulbs, the garden culture of which is dealt with in the first part of this article by J. P. Hudson, Horticulturist, Wellington, seems to remain unaffected. In the second part of the article, to appear in the next issue of the "Journal," the commercial production of tulips and diseases and pests affecting the plants will be dealt with.

THOUGH many wild species of tulips have been found, the origin of the present-day garden types is lost in antiquity. By the sixteenth century tulips had evidently been in cultivation for many years in the Middle East, as the varieties introduced into Europe about that time had already been much improved on the wild species.

Early in the seventeenth century there was a boom in tulip growing in Holland, and prices soared to fabulous heights until the bubble burst in 1636. Despite this rather discreditable episode, which might well have brought tulips into disfavour, the flowers have remained favourites until the present. The Dutch took and maintained the lead in tulip production, and supplied practically all world requirements of bulbs of the garden varieties until recent years, when substantial bulb-producing industries have been developed in Britain, America, and, more recently, New Zealand.

Botany

The tulip belongs with hyacinths, lilies, and many other popular flowering plants to the great family *Liliaceae*, but is very different from these other members of the family in the habit of its growth, and as this affects its garden management, an understanding of the way in which a tulip plant grows is necessary.

Tulip bulbs are of two types, flowering and non-flowering. Both are covered with a tough brown outer scale (tunic), which serves only to protect the fleshy inside parts. If a flowering bulb is carefully pulled to pieces just before planting time, it will be found to contain inside four to six fleshy white scales (scale leaves), richly stored with food, all attached to a solid base (stem piece) from which the roots emerge. One small bud will be found near the base of each of these scale leaves.

In the centre of the bulb is a very much shortened flower stem, bearing three or four tiny but recognisable leaves, and a flower bud, already fully formed, with petals and the other parts clearly visible. A non-flowering bulb, on the other hand, is small and does not contain any flower bud at all, nor is there any way of making it flower in the first season after planting.

As size mainly determines whether a bulb has a flower bud or not, it is useless planting small bulbs and expecting them to flower in the first season.

After planting, a fringe of roots first grows from the base and later a spear-shaped shoot elongates from the bulb and comes to the surface, where it unfurls into leaf. In flowering bulbs three or four leaves grow, attached to the flower stem, which bears one terminal bloom.

While the flower is growing and before the leaves finally wither all parts of the old bulb dry up and shrivel, but at the same time some or all of the buds at the base of the scale leaves start to swell enormously and become complete new bulbs, which cluster round the base of the flower stalk and thus have one rather flattened side. Of these new bulbs the larger ones develop flower buds and so become flowering bulbs, but the smaller ones (sometimes called offsets) contain only an embryo leaf and are thus non-flowering bulbs. This completes the cycle of growth which follows the planting of a flowering bulb.

On the other hand, when non-flowering bulbs are planted each produces one single large leaf (referred to as "widows") and, of course, no flower. A new bulb arises inside the base of this single leaf, which ultimately withers away, and as the bulb has not been in competition with others, it is quite round, often with an elongated and curved neck. Bulbs produced in this way are called "maidens" and often contain a flower bud (that is, they are flowering bulbs), but they are not favoured by gardeners. The fact that the bulb did not flower in the previous season means that there can be no guarantee that it is true to name, though there is no other reason for avoiding maiden bulbs.

Sometimes tulips produce a curious, finger-like structure that grows deep into the soil and then develops a new bulb inside itself. These "droppers" are a means by which tulips can replant themselves at a greater depth, and are rather a nuisance in the garden, as dropper bulbs are usually overlooked when others are lifted and grow again the following year in places where they may not be

CULTURE OF TULIPS . . .

wanted. If these rogue plants grow in the following season among newly-planted tulips of another variety, they are referred to as "thieves" and have probably given rise to the belief that tulip plants often "sport." This is not the case, though useful sports (mutations) do sometimes appear and give rise to a worthwhile new variety and plants occasionally seem to revert to some ancestral type with long, narrow, pointed petals. Another curious feature is the occasional production of a new bulb above ground, where one of the leaves joins the flower stem.

Propagation

Though tulips can be raised from seed, plants raised in this way do not come true to type, except in the case of tulip species. The only method of propagating ordinary garden tulips is by planting the bulb and awaiting its natural increase.

Commercial bulb growers overseas usually sort out tulips into four grades—mother bulbs, flowering bulbs, stock bulbs, and rejects. For the large-flowered tulips, such as the Darwin varieties, the sizes of bulbs in these grades are:—

	Maximum diameter
Mother bulbs ..	.. 2in. and over
Flowering bulbs	.. 1.4 to 2in.
Stock bulbs ..	.. 1in. to 1.4in.
Rejects	.. Below 1in.

Every flowering bulb can be relied on to produce a full-sized bloom, and this is the type sold to the public, as they are sure to give satisfaction.

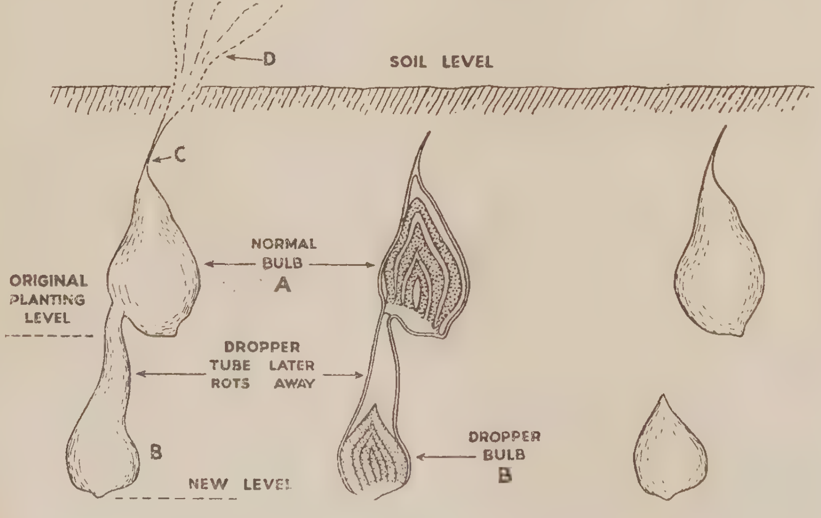
The mother and stock bulbs are planted back by the grower to increase his stock. Most of these bulbs flower, but the flowers are not cut for sale by overseas bulb growers, as that would involve removing one or more of the leaves required to feed the new bulbs. It is the practice to leave the flowers until they show colour so that any rogue plants can be dug out and destroyed, thus ensuring that the stock is true to name. The flower heads are then cut off just below the petals and thrown away, leaving the stem and all the leaves to nourish the new bulbs.

The smallest grades of bulbs (rejects) are usually thrown away, as overseas commercial growers regard them as more trouble than they are worth, though of course they will grow into flowering bulbs in one or two seasons if planted back.

Grading standards for New Zealand-grown tulip bulbs have not yet been fully worked out, but bulbs grown here are often smaller than the grades previously quoted. However, size is not everything, and for reasons explained later bulbs grown in the Dominion give much better results than the larger bulbs imported from overseas.

In the saving of home-grown bulbs in the home garden elaborate grading is not necessary, and bulbs need only be sorted into two lots, flowering and non-flowering. The dividing line between these two sizes should be so drawn that the non-flowering grade actually contains a fair proportion of flowering bulbs. This ensures that every one of the flowering grade is sure to flower and so avoids having a proportion of unsightly "widows" in the tulip bed. It is a good plan to cut open a few of the intermediate-sized bulbs to make sure that the grading is being done correctly, even though this means sacrificing a few.

FORMATION OF TULIP DROPPERS



At left is shown a normal bulb (A) with dropper (B) attached, and in the centre the bulbs and dropper tube are shown in section. The tube ultimately shrivels up and leaves the bulbs detached, as shown at right, the dropper bulb being an inch or more deeper in the soil than the original. Droppers are specially liable to develop when small, non-flowering bulbs are planted. These produce "widows," and the long neck (C) is the withered remains of the single large leaf (D), inside the base of which the bulb develops.

Flowering bulbs are used for planting in borders, and the non-flowering grade can be put in some inconspicuous corner where they can grow on into larger bulbs. As it may be two or three years before some of the smaller ones produce flowering bulbs, many gardeners throw away the very smallest bulbs because of the difficulty of keeping the varieties separate for several seasons. Alternatively the smallest non-flowering bulbs can be grown separately from the larger ones. It is well worth while as soon as flowers of bulbs being grown on for stock show colour to cut them off just below their heads, as this will greatly increase the size of bulbs produced.

Acclimatising Bulbs from Overseas

There is a strongly-marked periodicity in tulips—that is, their growth is very closely linked with certain seasonal weather changes and plants are reluctant to change from their routine of rooting in autumn and winter, growing and flowering in spring, and resting in the summer.

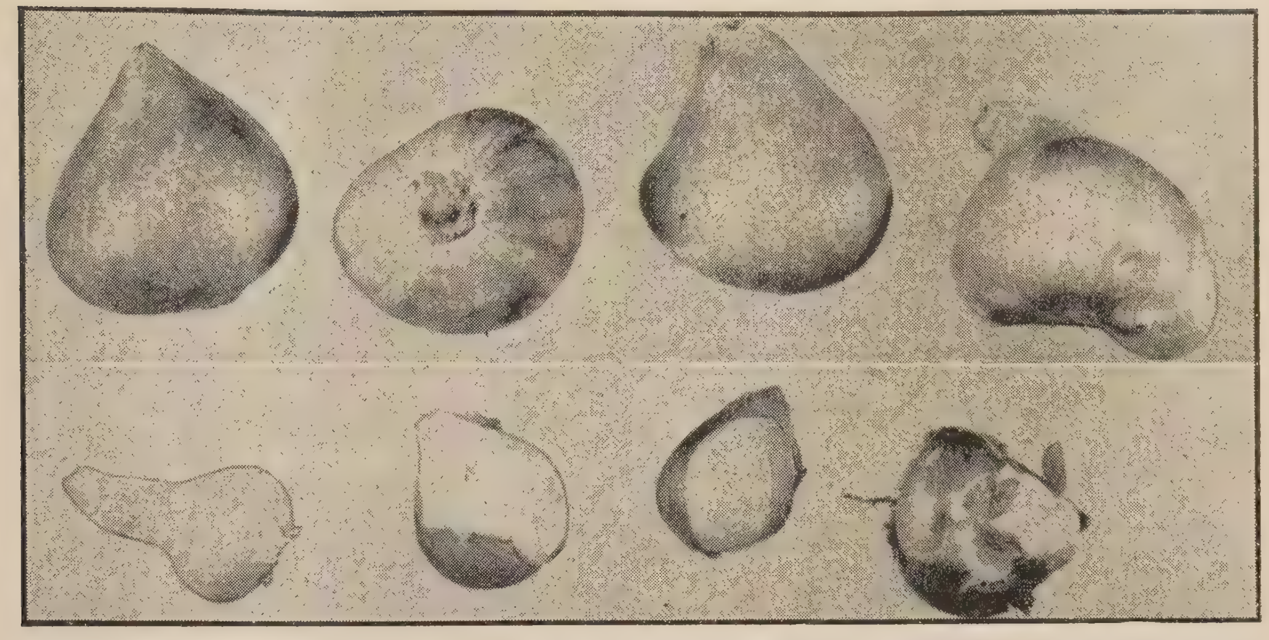
Bulbs transported to New Zealand from the Northern Hemisphere are six months out of season when they arrive here, which is very upsetting to their periodic life. The usual method of handling such bulbs has been for the importer to plant them in the coolest possible place as soon as they arrive and leave them to get accustomed to the new season. Very many of the bulbs, however, grow abnormally in the first season, and it is not until their second year in the Dominion that they are really at home, growing normally and fully acclimatised to the seasons of the Southern Hemisphere.

The problem of acclimatising bulbs could be more easily solved if bulbs could be "put to sleep" for an extra six months, and prolonged research at the Wageningen Laboratory in Holland has shown that this can be done with tulips. Bulbs are lifted normally, dried in the coolest, airiest place available, and then stored as soon as they are dry (before the flower bud starts to grow inside the bulb) at a temperature just below freezing point. They are held at this temperature for six months and then placed for seven or eight weeks in a warm store to encourage development of the flower bud in the heart of the bulb.

If this treatment is correctly carried out, it should be possible to ship the bulbs to the other hemisphere either during or after cold storage and to grow a normal crop of flowers in the first season after planting, but the temperature requires critical control and the bulbs may be damaged unless the treatment is followed exactly.

For this reason New Zealand-grown tulips are always best for New Zealand gardens, and it is much better for home gardeners to leave the proper acclimatisation of imported bulbs to nurserymen who understand this business, thus avoiding many of the disappointments and losses which are bound to occur when bulbs newly arrived from the Northern Hemisphere are planted up in the home garden.

GARDEN CULTURE OF TULIPS



A good line of tulip bulbs (upper row) will find a ready market and give every satisfaction. Ungraded bulbs—damaged, maidens, or diseased—like those in the lower row are unsatisfactory to the buyer and damaging to the reputation of the seller.

Situation

Tulips can come to perfection only in a situation which is sheltered from very strong winds, but the two most important factors in choosing a place to plant them are coolness and cleanliness of the ground.

Tulips require appreciably cooler growing conditions, for instance, than hyacinths, and it is important in warm northern districts to plant them in the coolest possible parts of the garden. A good display of flowers cannot be expected from tulips planted in a hot, shallow soil, and new bulbs produced in such a place will be unsatisfactory for future planting. This is probably the main reason why most imported bulbs are acclimatised and commercial supplies of bulbs grown in cooler districts of New Zealand where winter temperatures are relatively low.

The other all-important condition governing selection of a site for good tulip growing is that no tulips attacked by tulip fire disease (described in detail later) should have been growing within recent years in the plot chosen, as the soil remains infected with this disease for at least four years, and bulbs planted in infected places within that time are liable to be very seriously affected.

Soil Requirements

Most garden plants that have been popular for hundreds of years are fairly tolerant and will grow well in a wide range of soils, which is no doubt the main reason they have become such universal favourites. Tulips are no exception to this rule. They naturally do best in a deep, fertile, well-drained loam, but will grow in soils ranging from fairly heavy clays to fairly light sandy soils, provided that they are reasonably well drained. If the soil waterlogs for any length of time in winter the tulip roots and even the whole bulb will rot and die, and on poorly-drained soil it is essential to arrange for surplus water either to run off into a ditch or to go through the soil into some system of underground drains or sump.

Tulip roots will penetrate deeply into suitable soil, usually until they meet the water-table or soil too hard for them to penetrate. Beds should always be dug over as deeply as possible before planting, and the subsoil should be broken up if necessary, but without bringing it to the surface, except in very small amounts. In Holland it is common practice to turn the soil over completely to a depth of 2ft., but this can be done safely only on deep soils which have been so improved by long cultivation that the whole of the top 2ft. or more is fertile.

Tulips do not thrive in a soil that is too rich or very acid. Dressings of old, well-rotted animal manure or compost dug into the ground before planting are always worth while, as the humus does so much to improve the texture of the soil.

Use of Fertilisers

A certain amount of experimental work has been done overseas on the manuring of bulb crops, but investigation has proved extremely difficult, as each healthy bulb already contains most of its food for the coming season and bulb crops often give little or no response to fertilisers in the first season. There should be no need to add any special fertiliser to the soil when planting tulips, especially if the border has been regularly dressed with the complete flower border fertiliser described on page 411 of the April, 1948, issue of the "Journal."

However, there is a good deal of evidence that tulips grow best in a soil to which lime has recently been applied, and it is recommended that the ground be dressed with about 4oz. of carbonate of lime (garden lime), which should be scattered evenly after planting the bulbs and lightly hoed or raked into the surface layer of the soil.

Planting Out

Spacing: Tulips undoubtedly make the best display if planted fairly close together in beds or clumps to give a massed effect. For this purpose they can be spaced as little as 6in. apart, but are usually put out rather more widely, up to 10in., and are often interplanted with forget-me-nots, violas, polyanthus, or other fairly short spring-flowering plants which produce a carpet of colour that serves as a foil to the tulips. In this case it is best to set out the bedding plants first and then plant the tulip bulbs between them.

Depth: Four inches to the base of the bulb is usually regarded as the ideal depth to plant tulip bulbs in average soil uncontaminated with fire disease, but a little deeper is preferred on light soils and only about 3in. if the soil is heavy. It is an advantage to plant much deeper than normal if the bulbs or beds are suspected of being affected by fire, as deep planting helps to prevent this disease from being troublesome. Deep planting is also advantageous in warm districts, as the lower levels of the soil remain relatively cool. A depth of 10 to 12in.

would be advisable for planting in a hot district, especially if the soil is light and sandy, but planting at this depth makes lifting difficult and is practicable only in a garden where the ground is perfectly drained and where the bulbs can be left in the ground for a few seasons before lifting them again.

Date of planting: This also depends on the locality. In warm districts it is best to leave bulbs in a cool place until late autumn and plant them in May, when the ground has begun to lose its summer heat, but elsewhere March and April are the best months for planting, February being too early even if the bulbs are available.

Winter Cultivation

Little cultivation is usually required other than cracking the surface of the soil if it shows signs of caking after rain. A keen lookout should be kept for "primary infections" of tulip fire (see later section) when the shoots begin to appear in spring, and any withered or abnormal-looking plants should be removed and burnt as soon as they appear. If it is necessary to hoe or cultivate between the growing plants, care should be taken to avoid bruising the foliage, which makes it more liable to attack by tulip fire.

The growing crop needs little attention, as tulips do not usually require watering, feeding, or mulching. The most important spring work is to watch the plants closely for rogues (flowers not true to character for the variety concerned) and for the appearance of pests and diseases, which should be dealt with at once, as described later. Roguing is a most important operation where named varieties are kept separate, as it is only at the flowering stage that varieties can be recognised and off-types removed from the named stocks. Tulips look best when massed in separate colours and nothing looks worse than a block of flowers marred by a few of some other clashing colour.

Lifting the Bulbs

Tulips can be planted deeply and left in the ground for several years in beds or borders where they will not be disturbed by subsequent cultivation, and deep planting has much to commend it for the reasons given earlier. When planted in this way the leaves and stems should be allowed to die down completely each year before they are removed for the sake of tidiness.

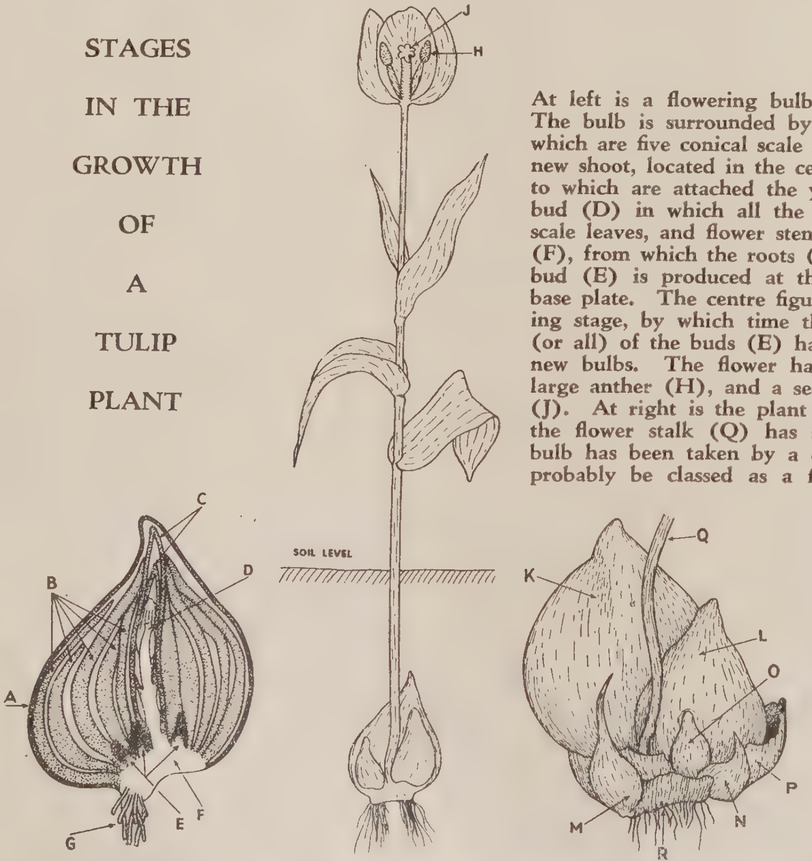
When tulips are to be lifted it is always best, whether the bulbs were planted deep or shallow, to wait until the stalks die almost completely down before digging the bulbs. The stem should be cut just above the ground and left as a guide to the position of the bulb when digging. However, it is not always convenient to leave tulips until the stalks have died down, and there are two other methods of lifting.

If tulips are used as a feature of bedding schemes, the spring display culminates with the mass of tulips all in bloom at the same time and growing through a groundwork of some other flower. Where such bedding is practised it is usual to plant the bulbs at the shallower depths previously recommended (3 to 5in.) and lift them each year as soon as their flowers are over, without waiting for the leaves to die down, to make way for summer bedding plants. This has to be done with understanding, as it involves digging up the plants before all the useful material in the leaves has passed down to the bulb and so interrupts the flow of food to be stored in the bulb until next season. Ruthless removal of green leaves has a very serious effect upon the size of the new bulbs, which may not be large enough to flower the following season if the leaves are cut off too soon.

It is quite safe to lift tulips carefully about three weeks after the petals drop, even if the leaves are still green, provided the leaves and stalks are not cut off but the whole plants are laid out thinly in trays and left in an airy, shaded place to dry off. However, tulip beds soon look dilapidated when the petals fall, and it is often necessary to lift tulips earlier than three weeks after flowering to tidy up and plant the beds again.

In this case the tulips should be dug out carefully, preserving a little of the

STAGES IN THE GROWTH OF A TULIP PLANT



At left is a flowering bulb cut vertically in half at planting time. The bulb is surrounded by a hard, brown skin (tunic) (A) inside which are five conical scale leaves (B) fitting inside each other. The new shoot, located in the centre of the bulb, consists of a short stem to which are attached the young foliage leaves (C) and the flower bud (D) in which all the floral parts are already formed. Tunic, scale leaves, and flower stem are all attached to the fleshy base plate (F), from which the roots (G) arise when the bulb is planted. One bud (E) is produced at the place where each scale leaf joins the base plate. The centre figure shows the growing plant at the flowering stage, by which time the old bulb has shrivelled up and some (or all) of the buds (E) have swollen enormously and changed into new bulbs. The flower has six "petals," six stamens, each with a large anther (H), and a seed box surmounted by a wrinkled stigma (J). At right is the plant at the end of the growing season, when the flower stalk (Q) has shrivelled up and the place of the old bulb has been taken by a cluster of new ones. Of these K would probably be classed as a flowering bulb and L would be planted up again as a stock bulb, though it too might flower. Bulbs M, N, and O might be discarded or might be grown on for two or more seasons until they reached flowering size. Nothing now remains of the bulb originally planted except the tattered tunic (P) and the shrivelled base (R), both of which are easily cleaned off. (The centre figure is drawn to half the scale of those at left and right.)

[*Diagrams after Mulder, Luyten, Hall, etc.*

The larger bulbs produce plants that all bloom (left), whereas each of the smaller, non-flowering bulbs produces one single large leaf ("widow") as shown on the right. This spoils the effect where bulbs are planted for massed display in the flower garden. Small bulbs should be grown on elsewhere until they are of flowering size.

root system if possible, and at once heeled back into the ground in some odd corner where they can complete their ripening and die down naturally. The plants should not be left lying in the sun between being lifted and replanted.

Lifting and replanting in this case is done as much to keep the bulbs cool as to encourage further vegetative growth, which is not needed at this season of the year. All next year's tulip leaves have to form inside the bulb before the flower bud can develop, and the leaves form most naturally at relatively low temperatures in the soil. High temperatures at this stage will hinder the formation of leaf buds, and thus lead to poor development of the floral parts.

If foliage is cut off bulbs too early, before it has fully died down, bulbs are likely to be small and "windy," with hollow spaces between the bulb scales.

Cleaning Bulbs

Whether lifted with or without foliage bulbs should be dried off before being cleaned and sorted. It may take three or four weeks to dry bulbs to which the foliage is still attached, but a few days will suffice where the stalks were already dry before the bulbs were lifted. In all cases drying should be done in an airy, cool place, and it is essential that bulbs should at all times be shaded from the sun. The plants should be laid out in thin layers and not put into heaps, as they are anything but dormant at this stage, and the great activity inside the bulb, where the new organs are forming, results in the bulbs heating up rapidly if left in heaps, with the consequent development of unsightly moulds.

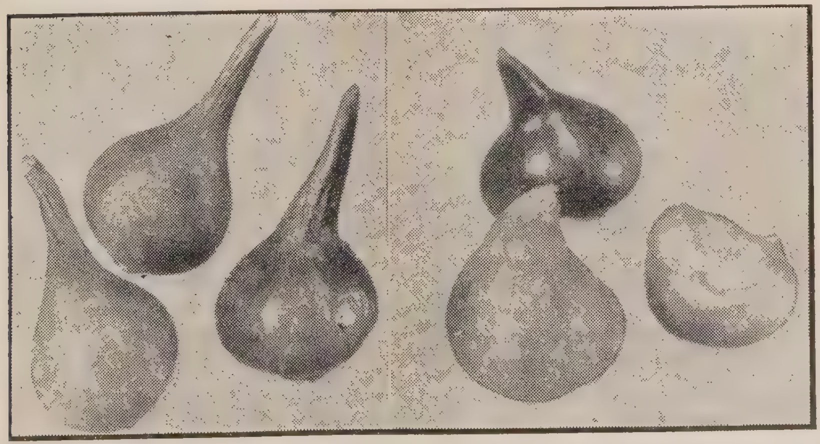
When the bulbs are quite dry all debris, loose skins, old roots, etc., should be cleaned off, taking special care **to remove everything of the dead leaf stalk.** Bulbs which are still clustered together should then be gently separated and all the bulbs finally sorted into the grades already described. Bulbs are usually dried off and ready for storage just before or just after the New Year, depending on whether the district is early or late.

Storing Bulbs

Tulip bulbs are usually out of the ground for about three months, from midsummer to autumn, and their subsequent behaviour is profoundly affected by the conditions under which they are stored. In the first place bulbs are not as tough as they look and should always be handled with great care. Bulbs dropped on a hard floor or bruised in any other way are very liable to go rotten before planting time or fail to grow properly when they are planted.

The other storage factor that affects the way in which the bulbs grow in the following season is temperature, which should be as cool as possible for home garden storage. Bulbs usually grow very poorly if they are left out in hot sun or stored in a warm place.

The best way to store bulbs after drying and cleaning is to put them in stout brown-paper bags in which holes have been punched to allow free circulation of air. Airtight tins or tightly-closed boxes are quite unsuitable and likely to result in bulbs going mouldy. The bags should be very carefully labelled to ensure that the bulbs are not mixed up and then kept on shelves or racks in a dry, cool, airy shed. Larger quantities of bulbs can be stored in shallow wooden trays with slatted bottoms stacked so that air can get freely to all the bulbs. In all cases bulbs should be kept away from draughts, which are said to cause the skins to crack unduly.



Bulbs with long necks and round bodies, shown on the left, are "maidens," produced from "widows" which did not flower last year. They cannot therefore be guaranteed as true to name. The irregular, flattened shape of the three bulbs on the right shows that they are from plants which flowered last season and are therefore likely to be true to name. These are the most satisfactory type to buy.

Tulips as Cut Flowers

Tulips are rightly among the most popular flowers, as they are beautiful, easy to arrange, and keep well in water. In home gardens the flowers should be cut when nearly fully open, stood at once in deep water for several hours to absorb as much water as possible, and then arranged in the vase. Tulip flowers open and close each day until fully blown, but usually tend to close up when cut and put into water.

GARDEN CULTURE OF TULIPS . . .

When cutting the flower at least the bottom two leaves should be left on the plant, otherwise the loss of leaves may prevent new bulbs from growing, though, as explained elsewhere, removal of even the top leaf and flower stem reduces the size and quality of the new bulb. The best plan is to plant some spare flowering-sized bulbs in the vegetable garden and grow them specially for cut flowers. These can then be cut down to the ground with magnificent long stems, and the bulbs, having served their purpose, can be ignored.

Some varieties suffer from the defect of having rather floppy stems, especially if they are out of water for a number of hours from the time they are cut until they are put into water. The best way to stiffen tulip stems is to shorten them by half an inch, lay all the stems on a sheet of paper with the heads just clear of one edge, then roll them into a tight bundle which should be put in water up to the flowers for an hour or two. As the stems take up water they will stiffen and when the bundle is unrolled the flowers will stand well in a vase.

Species and Varieties

Thousands of different varieties of tulips have been raised, though there are only a few hundreds at present in general cultivation. For convenience the varieties are arranged in groups which are classified mainly by their time of flowering and shape and colour of flowers.

Perhaps the most important event in tulip history has been the development of the Darwin varieties, introduced by Messrs. Krelage, of Haarlem, Holland. These varieties are outstanding for their length of stem, good colour, and the fine form and substance of the flowers.

Among the most popular varieties at present grown are:—

Early Flowering (shorter-stemmed than Darwins)

Keiserskroon: Rich scarlet and yellow; 14in.
Gen. de Wet: Orange-scarlet, scented; 14in.
Cottage Maid: Rosy white; 12in.
Vuurbaak: Double scarlet; 12in.

Breeders (self coloured but very subject to breaking)

Bronze Queen: Soft buff; 28in.
Cardinal Manning: Red and copper; 30in.

Darwin (tall varieties for bedding and cutting)

Allard Pierson: Deep crimson; 27in.
Clara Butt: Pink; 24in.
Pride of Haarlem: Cherry, scented; 30in.
Rev. H. Ewbank: Lilac; 25in.
The Sultan: Dark maroon; 27in.
William Pitt: Dark scarlet; 24in.
William Copeland: Lavender; 27in.

Cottage (shorter than Darwins and specially useful in windy gardens)

Caledonia: Orange scarlet, scented; 20in.
Inglescombe Yellow: Yellow; 22in.
Inglescombe Pink: Pink; 24in.

Parrot (flowers with fantastically cut and coloured petals)

Varieties of tulips vary in height, though there is remarkably little variation in the height of flowers from bulbs of the same variety. When planting tulips in beds it is best to keep the different varieties separate, as varieties flowering at different heights in the same bed give it a ragged appearance. The heights given above are only approximate and indicate the normal differences between the common varieties rather than the actual height in any particular year.

A number of the tulip species are also well worth growing, though they are not as showy as the garden varieties. Among the good species are:—

Tulipa clusiana: White tinged with red.

T. Eichleri: Scarlet, edged with yellow.

T. Greigii: Scarlet.

T. Kaufmanniana: Cream and yellow.

Raising New Varieties

Plants produced by vegetative propagation are normally exactly like their parents. This is both the strength and weakness of vegetative propagation—the weakness because new varieties cannot be raised in this way except for the very occasional and fortuitous appearance of a "bud sport" or mutation. A few good varieties of tulips have, in fact, arisen as sports from other varieties, but the majority have been raised from seed.

As all garden varieties of tulips are hybrids, they will not come true from seeds, and seeds from a single pod will produce many different types of plants. It is not very likely, however, that seed saved haphazard will give rise to worthwhile new varieties, which are more likely to be produced as the result of deliberate breeding where varieties with selected characters are bred together with some special object in mind.

The plant to be used as the female parent should be prepared by opening the flower bud before it shows colour, removing all the anthers (which should not, by then, be dusty with pollen), and enclosing the flower in a paper bag to await the time for pollination. This is indicated by a sticky, moist appearance developing on the stigma (see diagram on page 598). Meanwhile the flower to be used as a supplier of pollen should also have been bagged to prevent insects bringing to it pollen of other flowers.

When the stigmas are sticky (receptive) pollen should be transferred from the anthers of the male parent to the stigma with a camel-hair brush, which should be sterilised between each cross by dipping it into methylated spirits. Immediately after the cross is made the stigma should be covered with a little cottonwool and then the whole flower surrounded with a paper bag to keep it dry and to prevent spores of tulip fire blowing on to the developing pod.

It is best to sow seeds as soon as they are ripe in pots of good seed-sowing compost, and at the end of the growing season the tiny bulbs which are produced by means of droppers an inch or two deeper in the soil than the seed was sown may be lifted.

Thereafter the bulbs should be planted out and grown normally, and should grow larger bulbs each year until bulbs of flowering size, with four or five scale leaves, are finally produced in the fourth or fifth year.

Gardeners who are interested in raising tulips from seed will find much valuable information in Sir Daniel Hall's "The Book of the Tulip."

Tulips as Pot Plants

Tulips make fine pot plants if carefully grown and can provide a prolonged display of colour if planted in succession. Bulbs can be planted in ordinary flower pots filled with a good potting compost such as the John Innes mixture, prepared as described in the July, 1947, issue of the "Journal." Alternatively, if the bulbs are to be grown in ornamental bowls which are not provided with drainage holes, they should be potted in specially-prepared bulb fibre, sold by seedsmen, as soil goes sour and roots rot if the receptacle is not drained and is accidentally over-watered. Bulb fibres are made from a rough, fibrous grade of peat to which crushed charcoal and oyster shell are added.

Plant the bulbs with their noses just level with the surface, pressing the soil or fibre tightly between them and leaving the final surface about half an inch below the top of the pot or bowl to allow room for watering. Then stand the pots, or sink them in the soil to the rims, in the coolest, shadiest place available, water them thoroughly, and cover with old sacks or three inches of sand, soil, or well-weathered cinders to keep the pots cool, to reduce drying out, and also to prevent the bulbs from lifting themselves out of the soil as their roots grow. A temperature of 48 degrees F. is the ideal for the healthy rooting of tulips.

The earliest varieties should be potted up in February, followed at intervals by others, including the Darwin varieties, which grow well in pots.

After six to eight weeks in the cool temperature the pots should be lifted and cleaned up, the surface of the soil roughened by scratching it with a nail, and the pots brought into the house, where they should be stood for the first few weeks in the coolest window available. Use very little water at this stage, as over-watering will cause the leaves to grow too big and spoil the balance of the plants when in flower.

As soon as the flower buds can be seen the bulbs should be moved into a warmer room to flower and water can be given more freely. When the flowers fade the bulbs should not be thrown away, but the bowls or pots should be turned out and the mass of soil and bulbs planted intact in the garden.

A MAGNIFICENT GIFT

IN the year 1877 Sir George Grey, former Governor-in-Chief of the islands of New Zealand, presented his large and valuable library to the citizens of Auckland. This magnificent gift, together with the reference books of the Mechanics' Institute, formed the nucleus of the Auckland Public Library. The famous statesman had not only made a notable collection of historical and scientific works, but also of rare books, incunabula, manuscripts, and autograph letters. Another important feature of his library was its wide range of Maori literature, including some of his own writings. His handsome volume "Poems, Traditions, and Chants of the Maoris" had a Maori effigy embossed in gold upon the bright red cover and was inscribed: "The Honble. Wm. Swainson, with Sir George Grey's remembrances and regards," and dated 1853, the year of its publication. With the exception of the preface, the contents were wholly in Maori, handwritten notes here and there indicating such items as children's songs to the moon, a lament for Witini Taiporutu, who was killed at Mahoetahi (this was given added pathos by the fact that its composer died in battle the next evening), and a song for alternate male and female voices. Pencilled in the back was a boat song beginning:—

Spring to your oars
As the grasshopper springs at midsummer.
Pull away, pull away. . . .

Another copy likewise had sundry translations written alongside the poems, among them being the poignant fragment:—

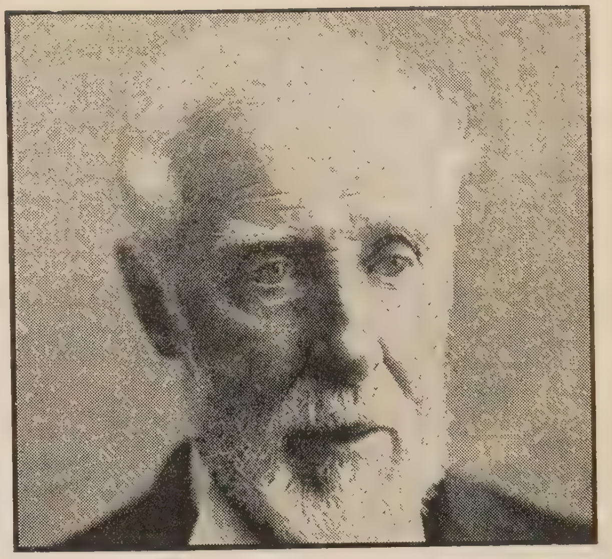
Farewell, my pet bird—a bird that has flown
Away from me. O spirits of my forefathers,
Shelter him kindly in your house.
He is precious as the ear drop of Matariki.

His "Mythology and Traditions of the New Zealanders" was published in 1854, the English version (which has become a classic) appearing the following year under the title "Polynesian Mythology." In his collection of "Proverbial and Popular Sayings" he coupled each native proverb with its English counterpart—a most effective arrangement. These maxims contain much wisdom and many of them are extremely poetical, for example, a man who is growing old is described as "ascending the snow-tipped mountain of Ruahine."

Maori prayer-books, grammars, almanacs, money-tables, translations of industrial acts, and pamphlets of various kinds all had a place in Sir George Grey's extensive library. The yellowed pages of the grammar compiled in 1842 by the Rev. Robert Maunsell are full of scholarly Latin quotations, typifying the erudition of the author. Mr. Maunsell comments in a footnote: "The friends of the aborigines will be gratified to learn that the first number of a Maori newspaper has just been printed in Auckland." On the last page of the grammar appeared a list of subscribers, Mr. W. Colenso taking a dozen copies.

William Colenso, pioneer printer at Paihia before joining the ranks of the clergy, was a noted authority on natural history and co-founder with Sir George Grey of the New Zealand Society for the Furtherance of Scientific Research. He was also a provincial inspector of schools for some years, and it was during this period that he wrote "Willie's First English Book" by order of the Government. Complete with "remembrances" to emphasise important points, the contents of this pocket-size volume in the pale-lavender binding aimed at bringing students past "the wearisome bitterness of learning," but it was rather surprising to read that Colenso, who was the first to print the New Testament in Maori and devoted most of his life to missionary work, purposely omitted all sentences of a religious nature in order that the book might have greater and more general use.

Someone had made a computation on the flyleaf of W. L. Williams's "First Lessons in the Maori Language": "Cost of 100ft. shingling: 1000 shingles 14/6; labour 2/6; nails 1/-. Total, 18/-." Obtaining a roof over one's head then was not the expensive business it is now. The cost of other building materials was equally reasonable, kauri being retailed at 27s. per 100ft. and bricks at £7 per 1000. It must have been much easier balancing the housekeeping budget, too, judging by the price lists quoted by the "Maori Messenger" in the late 1850's: "Fowls, 6/6 couple; turkeys, 10/- couple; pork, 10d. lb.; beef, 10d. lb.; hams, 1/-; coffee, 10d. lb.; wheat (1st quality), 12/- bushel; tobacco, 2/6 lb." You could buy a ton of firewood or a pair of boots (female) for 10s., and shoes were only 6s. a pair. The paper gave quite a proportion of space to overseas affairs, and shipping information, agricultural advice, local events, and even verses were included in its columns. In one issue, under the heading of provincial news, was the reassuring statement: "The class of settlers established at Wellington are of a high order." A severe earthquake in Wellington was the subject of cautious editorial comment: "The vibration did reach Auckland; in fact, we felt it ourselves, but so lightly that it was a disputed point whether the shock had taken place or not." However, there was no doubt about the damage in the Wellington area (every room in Government House was a pile of brickwork, the guard having a wonderful escape), and sympathy was expressed with the settlers in their losses.



Sir George Grey.

A small Maori almanac held an unexpected story. It had apparently been used as a diary by an early missionary who mentions an interview with Te Rauparaha. He continues: "Left Port Nicholson for Porirua. Laid up with ophthalmia—dark days." After the fifth day: "Rather better. Dr. H. came. Kept in the house with my eyes." Twenty-four hours later events took a tragic turn: "Horatio very unwell." Medical help being unavailable when most needed, the patient grew worse. A few days later "Horatio died at 11 a.m." There was no railing against "Dr. H's" mysterious non-appearance, only the plaintive query, "Why no dr.?"

After a hasty trip to Wellington he was "busy with coffin" for two days, and was then engaged in letter-writing. He also performed a large number of baptisms that week, wrote more letters, and packed. He records having been up all night before "sending cases off." They probably contained poor Horatio's personal effects and were being dispatched to his relatives in the Homeland. Parochial duties and mail kept him fully occupied for the remainder of the month. (If he habitually penned his epistles in as small a hand as the entries in his diary, it was no wonder he suffered with his eyesight.) In between further copious bouts of correspondence he packed in preparation for one of his periodical trips north, his visitations extending as far as Taupo.

These are but a few of the many interesting items to be found in the Maori section of the Grey collection in the Auckland Public Library. The presentation of such a collection, historically invaluable, for public use not only indicates a high sense of civic duty, but reveals the deep-rooted attachment Sir George Grey had for his adopted land.

Mary

Scone Mixture for

NEW ZEALAND housewives are noted for their good scones and certainly country women have plenty of practice, for scones are usually baked every day. Perhaps it is not generally realised that the same quickly-made mixture can be the foundation of many other dishes. Some variations on the scone theme which will produce puddings, savouries, and buns are described in this article by Eva Topping, Rural Sociologist, Auckland.

TO print a scone recipe for New Zealand readers seems superfluous, as almost everyone has her own special way of making good scones. The recipe which follows is included because it is referred to as the "standard recipe" to which additions and alterations are made for a variety of dishes.

Standard Scone Recipe and Method

8oz. of flour (2 cups)
2 rounded or 4 flat teaspoons of baking powder
About 1 cup of milk
2 flat tablespoons of butter or other fat
Salt

Sift the flour, baking powder, and salt into a mixing bowl and rub in the fat. Mix them with milk to a soft dough, turn it on to a floured board, shape it into a smooth lump, and pat it with the hands or roll it lightly to the desired thickness. Cut it into shapes, place them on a floured or greased oven tray, and bake them in a hot oven (425 to 450 degrees F.) for 10 to 15 minutes.

For plain scones omit the fat.

Varieties of Scone

Many variations of the standard scone mixture are frequently used and need not be listed, but here are one or two less common kinds of scone:—

Savoury-filled Scones

These scones are good for picnics or lunch boxes. Make the usual mixture or that given in the standard recipe, roll or pat it to ¼in. thickness, and cut it into small rounds. Spread half of them with melted butter or soft bacon dripping and then with a finely-minced cooked-meat mixture. Cover them with the rest of the rounds and brush sides and tops with milk or beaten egg. Place them on a prepared oven tray and bake them in a hot oven (450 degrees) for 10 to 12 minutes.

For the meat fillings, use minced cooked beef or mutton seasoned well and moistened with rich gravy. Ham or

Above—Fruit pyramid.

Below—Orange scones and jam scones.

a Variety of Dishes

lightly-cooked bacon, finely chopped and seasoned with salt, pepper, and mustard, is very good.

Jam Scones

Roll the mixture ¼in. thick and cut it into rounds and rings. Spread the rounds with a little butter and then with jam. Place the rings on top and bake them.

Orange Scones

Add 1 tablespoon of sugar and an extra tablespoon of fat to the standard recipe. Grate the rind from 1 orange, mix it with 2 tablespoons of sugar, and make it just moist with orange juice. Roll the scone dough to 1/3in. thick and cut it into rounds. Make a depression in the centre of each round by inserting a floured finger and fill the hollow with the orange sugar.

Split, buttered, and served hot with milky coffee, orange scones are delicious for morning tea.

Rusks

Add 1 tablespoon of fat and 1 egg to the standard recipe. Beat the egg well and use it in place of part of the milk. Roll the dough ¾in. thick and cut it into oblongs or rounds. Bake them as usual, take them from the oven, and split them with two forks. Bake the split scones again in a rather slower oven until they are crisp and golden brown.

Rolls and Buns

By adding extra fat, sugar, eggs, spices, flavourings, and fruit to the standard recipe, the plain types of buns, teacakes, puddings, and savoury dishes are made.

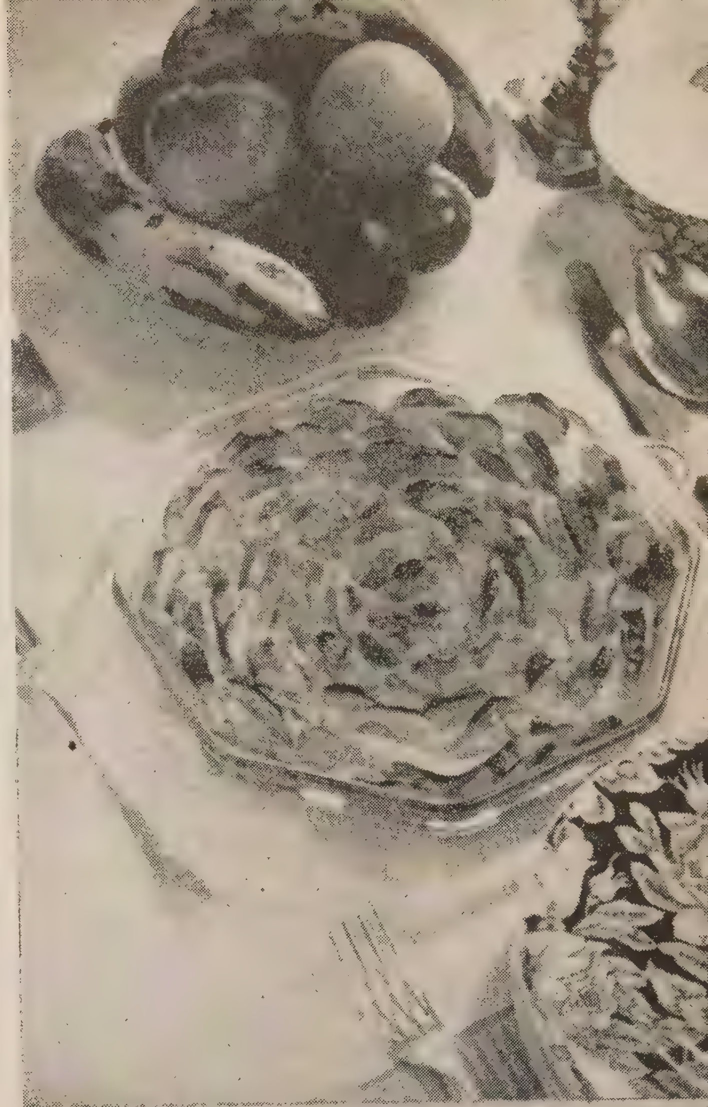
Folded Rolls

Use the standard mixture and add 1 egg, using less milk or a little more flour. Mix the dough, turn it on to a floured board, pat it to 1/3in. thick, and cut it into large rounds. Crease each across the centre with the back of a knife, spread one side with softened butter, and fold the other side over. Put them on to a cold greased or floured oven sheet and leave them to stand for about 15 minutes. Brush them with milk or melted butter just before putting them into a hot oven (425 degrees) for 15 to 20 minutes.

Shamrock Rolls

Use the standard recipe without alteration. Grease a set of bun tins. Roll the scone mixture into small balls and put three into each bun tin. Stand them aside for 15 minutes, then brush them with milk or melted butter before baking them.

Photographs reproduced on this and opposite pages by Sparrow Industrial Pictures Ltd.

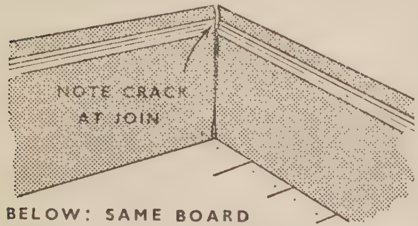


Above—Apple-cake pudding.

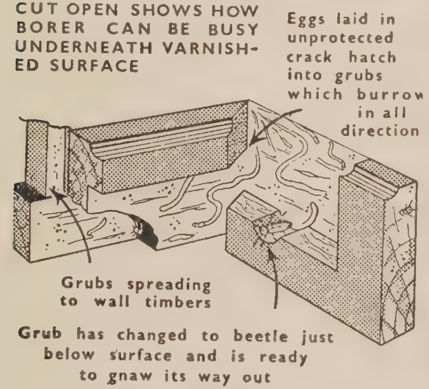
Below—Shamrock rolls and folded rolls.

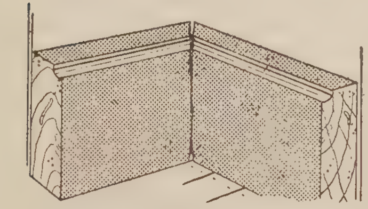
Why SERVICE is sometimes necessary after treatment

SOUND-LOOKING VARNISHED SKIRTING BOARD SHOWS NO SIGN OF BORER


NOTE CRACK AT JOIN

BELOW: SAME BOARD CUT OPEN SHOWS HOW BORER CAN BE BUSY UNDERNEATH VARNISHED SURFACE


Eggs laid in unprotected crack hatch into grubs which burrow in all direction
Grubs spreading to wall timbers
Grub has changed to beetle just below surface and is ready to gnaw its way out



IN TIME, UNSIGHTLY FLIGHT HOLES MAR PREVIOUSLY SOUND-LOOKING SURFACE

1 A Boracure treatment usually consists of (a) flood spraying and injecting the entire under-structure (which is very vulnerable to attack) and (b) injecting and otherwise treating infected parts elsewhere. However, there are obviously hundreds of places in a house which appear borer-free and thus do not receive treatment, such as the skirting board shown above.

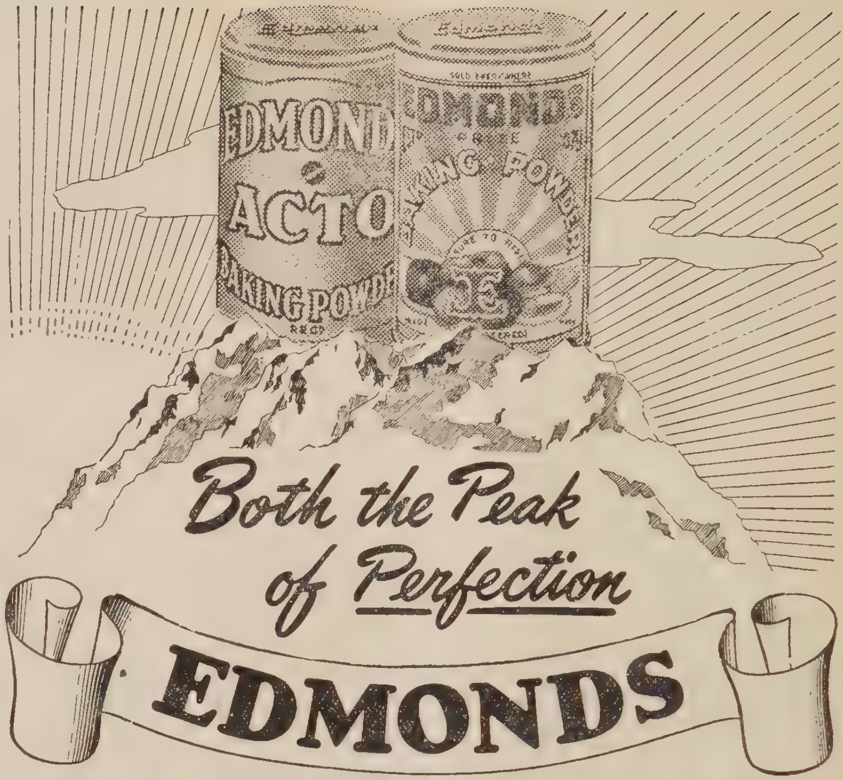
2 But in some of these 'sound' looking places borer grubs may be busy beneath the surface.

3 Eventually these hidden borer grubs change to beetles and emerge from flight holes, this being the first sign of their presence. Because of the extended life cycle of the borer, these flight holes may not appear for some years.

Boracure recommend their Insulation Contract which guarantees periodic inspection and treatment for 5 years (or longer if desired). Insist on GENUINE Boracure.

217 LAMBTON QUAY, WELLINGTON
Phone 40-050
Branches throughout the country.

BORACURE (N.Z.) LTD


EDMONDS ACTO BAKING POWDER
EDMONDS SURE TO RISE BAKING POWDER
Both the Peak of Perfection
EDMONDS

'SURE-TO-RISE' and 'ACTO' **BAKING POWDERS**

PRODUCTS OF T J EDMONDS LTD. CHRISTCHURCH

63.6

SLEEP LIKE A TOT WITH
AIR CELL
The Blankets that B-R-E-A-T-H-E

WHOLESALE DISTRIBUTORS—
SARGOOD, SON & EWEN LTD.

Cinnamon Buns

Use twice the ingredients in the folded roll recipe and add 2 tablespoons of sugar. Roll the dough very thinly, spread it with softened butter, sprinkle it with brown sugar, cinnamon, and raisins or sultanas, and form it into a long roll. Cream 6 flat tablespoons of butter, lard, or mild dripping with 6 tablespoons of brown sugar and spread the mixture thickly on the sides and bottom of a round tin—a heavy frying pan is most suitable if the handle will fit inside the oven. Cut the roll into slices 1½in. thick and arrange them close together with the cut sides uppermost in the tin. Stand them aside for about 15 minutes, then bake them in a hot oven for 25 minutes.

Turn the buns upside down on a plate and serve them hot for lunch or morning tea.

Nut Tea-cakes

Use the standard recipe, adding 4 tablespoons of sugar and 1 egg, doubling the quantity of fat (4 tablespoons), and reducing the milk to ½ cup. Cut the dough into six long narrow pieces, roll them with the hands until they are long and thin, and spread them with softened butter. Cut each long roll in two, lay the halves side by side, and, beginning at the centre, twist them together and form them into a crescent shape. Sprinkle them thickly with chopped nuts, lay them on a greased oven tray, and bake them in a hot oven for 15 to 20 minutes. While the cakes are hot, spoon on a thin white icing made with ½ cup of icing sugar and 1 tablespoon of hot water.

For a variation, omit the nuts, ice the cakes, and sprinkle them with desiccated coconut.

SCONE MIXTURE RECIPES

[*Sparrow Industrial Pictures Ltd. photo.*

Rusks made with a variation of the scone mixture.

Puddings Using Scone Mixture

Cinnamon-top Pudding

Add 2 tablespoons of sugar to the standard recipe. Mix the dough and spread it ½in. thick in a greased sandwich tin. Spread cinnamon mixture on top and bake the pudding in a moderately-hot oven (400 degrees) for half an hour.

Cinnamon mixture: Mix thoroughly 3 tablespoons of flour, 3 tablespoons of sugar, 1 tablespoon of cinnamon, and 3 tablespoons of butter, and spread it over the scone dough before baking it.

Served cold this recipe makes a good cake for lunch or morning tea. It keeps fresh for several days if stored in a tin.

Apple-cake Pudding

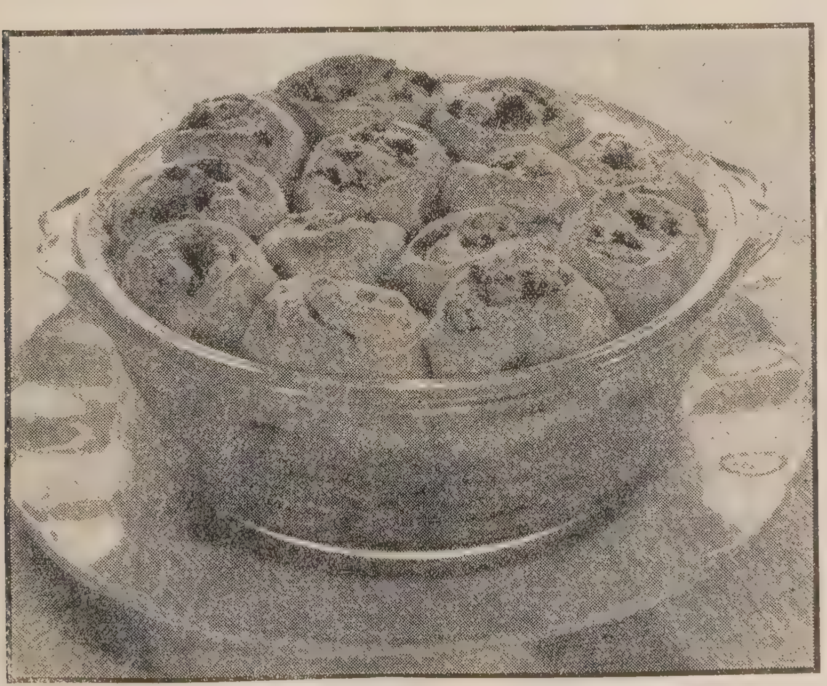
Make the usual scone mixture, adding sugar and 1 egg. Pat the dough into a glass ovenware pie plate or sandwich tin. Press the edges of prepared apple slices into the dough close together. Mix 1 tablespoon of butter and 2 tablespoons of brown sugar and sprinkle it over the apples. Bake the pudding in a moderate oven for half an hour or until the apples are tender and glazed.

Syrup Scone Steamed Pudding

Make a plain scone mixture with 2 cups of flour, 2 rounded teaspoons of baking powder, a pinch of salt, and milk to mix them to a soft dough. Turn the mixture into a large greased pudding basin. Put 2 tablespoons of butter, 2 tablespoons of golden syrup, and ½ cup of sugar on top and pour over 1 cup of hot water. Stand the basin in a saucepan containing enough rapidly-boiling water to reach halfway up the basin and steam the pudding for 40 minutes. Do not cover the basin and do not steam the mixture for longer than 40 minutes or it will be soggy.

Peach and Honey Roll

Use the standard scone mixture, adding 1 tablespoon of sugar and 1 egg



[*Sparrow Industrial Pictures Ltd. photo.*

Parsley wheels for crust on a shepherd's pie.

and using less milk. Turn it on to a floured board and roll it into an oblong ¼in. thick. Lay cooked dried peaches over the dough and roll it up. Put the roll into a baking dish and pour over it 3 tablespoons of honey melted in sufficient hot water to make ¾ breakfast cup of liquid. Bake the roll in a moderately-hot oven for 35 to 40 minutes. Thicken the surplus fruit juice with cornflour and serve it as a sauce.

Dried apricots can be used instead of peaches if preferred.

Fruit Pyramid Pudding

Make 1 pint of red jelly the day before and put it aside to set.

Make the standard scone mixture, adding 1 tablespoon of sugar and 1 egg. Roll it out and form it into three different-sized scones ½in. thick, using a bread and butter plate (about 7in.), a saucer, and a teacup for judging the sizes. Prick them over, bake them, and roll them in a clean cloth to cool.

Take 1lb. each of two kinds of fruit, one sweet and one tart, with a good contrast in colour, such as apples and dark red plums, or pears and damsons. Stew them separately, making as little juice as possible. Preserved fruit can be used in winter and then, as the choice will not be so restricted by the fruit in season, many more combinations are possible. Try black currants with peaches, raspberries with nectarines, or apricots with gooseberries.

When cream is again allowed, whip the desired quantity, sweeten it, and divide it into three portions; tint one pale pink, another pale green, and leave the third white. At present mock cream will have to suffice; recipes for it are given later in this article.

Split the two larger scones, fill them with the paler fruit, and put a few blobs of green-tinted cream at the edges where they will show. Arrange the more colourful fruit on top of each scone and put pink cream at the edges. Pile the filled scones, put the smallest one on top, spread the last of the paler fruit on it, cover it with white cream, and decorate it with blobs of green and pink cream. Set the pyramid on a serving dish. Break up the jelly with a fork and put it round the pudding, decorating it with the rest of the white cream. This is a festive-looking sweet which would make a suitable dish for a birthday party.

Strawberry Shortcake

Add 1 egg, 2 tablespoons of butter, and 1 tablespoon of sugar to the standard recipe; less milk will be needed. Divide the dough in halves and shape each into a round to fit a deep pie plate. Spread one round with softened butter, place the other on top, and bake them in a hot oven for half an hour. Break the scone into two and put mashed ripe strawberries between and on top. When cream is available put a layer of lightly-sweetened whipped cream over the crushed fruit on the top layer and decorate it with whole strawberries.

Any kind of stewed or preserved fruit can be used to make a shortcake. The fruit should be drained for the filling and the juice, as it is or thickened slightly with cornflour, served separately as sauce.

Mock Cream

First recipe: Mix 1oz. of butter and 2oz. of sugar with 3 dessertspoons of boiling water until the sugar is dissolved. Stir in full-cream milk powder gradually until the mixture is the desired thickness. Add flavouring and colouring.

Second recipe: Cream 1oz. of butter and 2oz. of icing sugar and add top milk drop by drop until the mixture is the consistency of whipped cream.

Savoury Dishes

For the tops of meat casseroles, minced meats, and similar dishes, scone mixture makes an appetising change from pastry and suet crusts. Roll the dough thinner than for scones, cut it into rounds, and arrange them on top of the meat, leaving spaces between. Put the scone mixture on the meat about 15 minutes before the dish is needed and increase the heat to 425 degrees so that the scone crust is nicely browned and crisp on top.

Parsley Wheels for Pie Crust

Use the standard mixture, roll the dough very thin, and sprinkle it with 2 large tablespoons of chopped parsley, salt, and pepper. Roll it up, cut it into 1in. thick rounds, and arrange them on top of the meat with the cut sides showing.

As a change from mashed potatoes, these parsley wheels are excellent for the top of a shepherd's pie.

Savoury Dumplings for Stews

Add chopped parsley, powdered sage and thyme, onion juice, salt, and pepper to the standard scone mixture. Form it into small balls and drop them into the stew. Cover the pot closely and cook them for about 15 minutes.

Cheese Crisps

Halve the standard recipe, omit the milk, and add 1 cup of grated cheese, a pinch of cayenne pepper, 1 egg, and 2 tablespoons of milk. Mix the flour, pepper, salt, and baking powder, rub in the fat, add the cheese, and mix with beaten egg and just sufficient milk to make a stiff dough. Roll the mixture ⅛in. thick and cut it into strips 4 to 5in. long and ¼in. wide. Bake them in a hot oven for 10 minutes. Cool the crisps and store them in an airtight jar or tin.

Hot Dish for Lunch or Tea

Bake large round scones made from the standard recipe but using double the amount of fat. Split the scones while they are hot and fill them with hot minced meat, fish in white sauce, stewed mushrooms, or a cooked tomato-cheese mixture. Any left-over meat, chicken scraps, ham, or boned rabbit can be reheated in gravy or white sauce and used to fill the hot scone cases.

◆

Prevent the "Sweet" Habit and Save the Teeth

HABITS are formed early in life and children readily acquire a taste for sugary foods such as sweets, biscuits, cakes, and sugary drinks.

Frequent consumption of these leads to Decayed teeth — Loss of appetite —Upset of nutritional balance.

Control of the "Sweet" habit rests with the parents.

Therefore

(1) Encourage as an alternative a fruit eating habit.

(2) Have more raw vegetables in the diet.

(3) Prepare wholesome food for the table attractively.

(4) Reduce the sugar in the diet to a minimum—particularly cut down the amount of sugar in drinks such as cocoa.

(5) Reduce "cordials" to a minimum.

(6) Cut out "in between" meals, and "bits" and "pieces."

(7) Keep party foods for party occasions.

(8) Clean the teeth *immediately* after meals.

Work into the diet more milk, eggs, meat, liver, fish, vegetables, raw fruit, wholemeal bread, cheese, iodised salt, and your full butter ration.

ISSUED BY THE DEPARTMENT OF HEALTH

Planning the Flower Garden for Colour

ARE New Zealanders afraid of colour in their homes and gardens? The main theme of this article by J. P. Hudson, Horticulturist, Wellington, is that too few home gardeners plan and plant their gardens for colour effects.

AN observant New Zealander, recently returned from extended visits to countries in Europe and America, said he thought the most beautiful countryside in the world was still to be found in rural England and Scotland, while the villages of Switzerland had a particular charm because they were so colourful. He added: "We seem to be afraid of colour in New Zealand."

That is at once a reproach and a challenge that should be taken up by everyone interested in the amenities to be enjoyed in the Dominion by this and the next generation.

Largely Man-made Beauty

What makes the British countryside so attractive and the Swiss villages so colourful? Is it the shape of the earth—the bare bones and skeleton on which the landscape scene has been built up? Or is it the buildings, many so ancient that they seem now to have become a part of the very fabric of the land?

Neither of these is the main attraction. Analysis of almost any British scene will show that the picture is framed in ancient and beautiful trees, while buildings and landscape are knitted together by more trees, shrubs, and flowering plants, growing together in perfect harmony. In Switzerland the riot of colour in summer stems as much from flowering plants as from the paint pot, and the villages look so trim because someone, at some time, has done something about tidying up every corner, planting it with a shrub or tree, and leaving it with a finished look, though few Swiss houses have gardens as the term is understood in New Zealand.

In other words, the beauty of the scene is largely man made, but that is often overlooked because it has been made for so long that it now looks natural.

New Zealand has equal or greater natural advantages. The plains are just as fertile, there are as many hills or more, the mountains are as grand and beautiful as any overseas, and the climate is more equable, enabling a greater range of plants to be grown outdoors than in either Britain or Central Europe. Yet few people will deny that much of the New Zealand rural scene, with its eternal evergreens, lacks variety and colour, and in the towns far too many gardens are drab and colourless when they should be a blaze of flowers.

Planting for Posterity

The background against which the next generation and their children will live their lives depends on what is planted in the next few years. Those fortunate enough to live in districts where pioneers planted wisely 50 years ago will appreciate the full meaning of this, the first lesson to be learned from a study of the European scene. Beautifying societies, amenities societies, and, of course, the superintendents of parks and reserves in the cities have all been fully aware of this responsibility to posterity and in many districts have already planted what will become the backcloth of the future scene.

Town belts, street trees, and other major plantings are outside the scope of an article on home gardening, but the home gardener has his own particular responsibility in this matter, and should not let the planting season pass, especially in a new garden, without considering whether to plant a tree for posterity. Such trees must be chosen with the greatest care. In small gardens it is a mistake to plant a tree that some day will become too big, overshadowing or endangering the house and requiring hideous mutilation if it is to remain in bounds at all. Moreover, some trees can be very troublesome by suckering all over the garden or shedding limbs in a gale. For instance, elms are among the most beautiful trees in the English countryside, but the man who plants an elm in his small section in New Zealand will only store up trouble for himself and his neighbours.

[Douglas Elliott photo.

Waratahs and other Australian members of the protea family are among the few flowering shrubs that will thrive in dry clay soils and windy places, provided they are not subjected to more than light frosts. The New South Wales waratah *(Telopea speciosissima)* is one of the best of this family for planting in a dry, sunny situation.

Before planting a tree, home gardeners are recommended to read "Trees for Town and Country" (published for the Association for Planning and Regional Reconstruction, by Lund Humphries, London, 1947, price 37s. 6d in New Zealand). This book has exquisite drawings and beautiful photographs of 60 trees selected by the association as making the most worth-while contribution to the landscape picture and useful notes on the selection and cultivation of these trees in a variety of different situations. It is, perhaps, too expensive for most home gardeners to buy, but is no doubt obtainable through the library services and should be on the bookshelf of all societies interested in the beautification of towns and country. The book is written for English readers and, of course, refers to growing trees under British conditions, and that should be borne in mind when it is read.

Colourful Border Plants

Important though they are as features of the landscape, trees cannot be widely planted in the small home garden, but there are many colourful, easily-grown shrubs and border flowers that may be "common" but should be much more widely grown to provide the continuous display of colour that is possible in gardens in the milder districts. A much wider use of these reliable plants would soon result in gardens looking brighter and town streets less drab.

Some time ago the Royal New Zealand Institute of Horticulture proposed to institute an "Award of New Zealand Garden Merit" to be given to plants easy to establish, reliable in growth, regular in flowering, and making a prolonged display of colour in the garden each year. This move was welcomed by horticulturists everywhere, and as a first step toward its fulfilment it is understood that district councils of the institute have prepared lists of plants which they consider are most "garden-worthy" in their own districts. It is hoped next month to publish one or two of these lists, which are of great interest to home gardeners, especially those now making new gardens.

Meanwhile a new standard for gardening books written and published in New Zealand has been set recently. "Garden Treasures," by J. W. Matthews, editor of "The New Zealand Gardener" (A. H. and A. W. Reed, Wellington, 1947, price 12s. 6d), is most welcome as the first book of its kind to be published in the country and is worth a place on every home gardener's bookshelf.

Home gardening, as it is known today, is a comparatively new development. Only recently has the "man-in-the-street" expected a garden as a right and a necessity of life, and never before have so many householders had gardens of their own. A sound garden literature, written locally for New Zealand conditions, will be needed to ensure that the most is made of these new opportunities for leisure, and it is to be hoped that Mr. Matthews and others will publish more books of this type.

Garden Work for July

Chrysanthemums of the latest varieties should be put in a frame as soon as flowering is over and the stalks have been cut down, to await the growth of new shoots for cuttings, but August or September will be early enough to take cuttings of the border and earlier-flowering varieties. Where roots were hot water treated to kill eelworm, as described in the April issue, the stools should now have recovered from their check and new shoots, suitable for cuttings, should be growing. These must be struck in sterilised soil or soil in which chrysanthemums have not been grown before, as it is a waste of time to hot water treat the stools and then set out cuttings in a soil swarming with eelworms.

Composts for seed sowing or potting should be made up with the greatest care, using only the proper ingredients mixed in the correct proportions. Suitable composts are half the battle in growing good plants in pots and boxes. In the past a certain amount of mystery has been attached to composts, most professional gardeners having their own "pet" recipes, but extensive scientific research work has shown that so many different mixtures are not needed. To simplify the whole business of raising plants and make sure they grow well, home gardeners are advised to use the John Innes seed compost whenever sowing seeds in pots or boxes and the John Innes potting compost for all plants grown in pots. Full details of the recipes for these composts and the method of mixing and using them were given in the July and August, 1947, issues.

Manurial compost made last summer from dead flower heads, garden rubbish, lawn mowings, and household scraps should now be maturing and ready for use. It is best roughly screened to remove large pieces of unrotted material, which should be put back on to another heap. The fine, rotted compost can then either be spread over the garden and dug in or left as a surface mulch where flower beds and borders are full of plants and cannot be dug over. Efficient use of compost heaps should enable the home gardener to make enough compost from his own garden and household resources to apply a liberal dressing each year to every part of the garden except the lawn. This annual dressing of well-rotted organic matter is probably the most important single item in the management of the home garden and the one that pays the best dividend in keeping the garden really fertile and productive. However, the possible need to use some additional fertiliser, as described in the April issue, should not be overlooked.

Drainage of the soil is another of the important factors which decide whether a garden is mediocre or first class. A soil may be poorly drained because water cannot run through it quickly (as in the case of stiff clay soils), because there is nowhere for the water to go (where there is a layer of impervious clay or rock below the topsoil), or because the subsoil is already full of water (that is, it has a high water table, as in low-lying swampy land). In any of these cases heavy rain may add water to the soil more quickly than it can drain away, in which case the soil may become waterlogged and the water table will rise. (The water table is the level to which the soil is waterlogged. If a hole is dug, it will fill with water up to the water table level). The effect of waterlogging is to drive all the air from between the particles of soil, which has a disastrous effect on most garden plants. Most animals take in air at one point and distribute it from there all through their bodies, but each part of a plant has to do its own breathing. Of course, stems and leaves grow in air and can get plenty of it to breathe, but the roots of most plants have to get their oxygen from the small amount of air present in the soil. Consequently, the roots of most plants die if they are deprived of their supply of oxygen by a rising water table. Some garden plants are much more sensitive to waterlogging than others (aquatic and bog plants make special arrangements to meet the situation and are quite content in an airless soil), and some can readily make a new root system if a set of roots is killed by temporary waterlogging. Others again can stand a certain amount of waterlogging in winter when they are dormant but not in summer when in full growth, while in most cases the youngest roots die first as a result of drowning, often leaving undamaged a framework of older roots. In all cases, however, gardens will be much easier to maintain in a thrifty, satisfactory condition if the soils are well drained, and winter is a good time of year to think about this question. Places where water lies in a pool for hours or days after a heavy rain obviously need draining, but even though water never lies on the surface the soil may still be poorly drained. A water table that rises to within an inch or two of the surface in winter will kill plant roots just as surely as one which comes above the surface and forms a temporary pond, yet the gardener may not realise that the soil is badly drained. In new gardens after heavy rain it is a good plan to dig a few holes at this time of year and leave them open until spring to see whether the soil ever becomes waterlogged and, if so, how high the water table rises and for how long it stays dangerously high. Plans for proper drainage can then be made.

Chrysanthemum stools boxed in sterilised soil after being hot water treated to kill eelworm. New shoots suitable for taking as cuttings are starting to grow.

Frost makes soil loose and puffy, because freezing causes the water in the ground to expand slightly, pushing apart the crumbs and particles of soil, which are left loose when the water thaws. Alternate freezing and thawing are very advantageous on heavy clay soils, which should be dug over roughly in autumn and the clods left exposed to the weather until spring, by which time, in cold districts, the frost will have broken the soil down to a fine, friable tilth. However, the puffing up of soil is a disadvantage where hard wood cuttings of shrubs and small fruits were lined out in April to root. Cuttings will root only if firmly held by the soil to prevent their rocking in the wind. If a series of frosts loosens the soil, it should be trodden firm again along the rows of cuttings. Similarly, the soil should be refirmed round newly-planted shrubs and trees if it has been loosened by frost.

Gladioli may be planted out now in the mildest northern districts to flower by Christmas. Thrips are not usually troublesome on these earliest plants, though the pest may do serious damage to later gladioli in hot districts, especially if the summer is dry. In other parts of the Dominion it is still too early to plant flowering-sized corms, but in all but the coldest districts cormlets can be planted this month or next, as soon as the soil is dry enough and in suitable condition for working, to give them the longest possible growing season. Cormlets should be sown 1in. apart in drills 1 to 2in. deep.

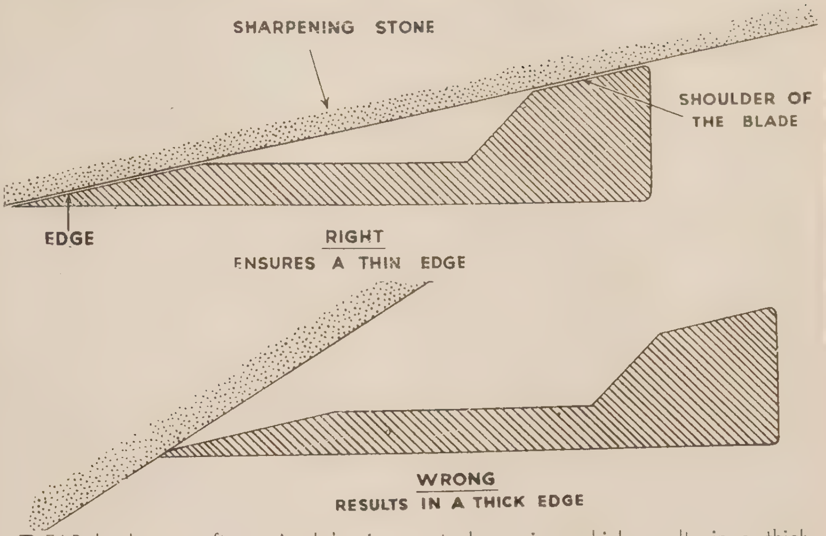
Hydrangeas do best in partial shade, as the flowers are likely to fade and scorch if exposed to the full sun. The newer, brightly-coloured types are far more showy than the old, insipid, white or pale blue varieties, which are not worth planting. A position providing some shelter from the wind and a certain amount of shade should be chosen for hydrangeas.

Lawn grasses grow throughout the winter in many districts and it is important to mow regularly if the grass is growing. The finer grasses thrive only if light reaches their crowns. If grass is allowed to grow long in winter, the coarse grasses will overshadow the finer ones, which will suffer from this competition. To preserve a fine grass lawn it is necessary to mow regularly through the winter, but the blades should be raised slightly and the machine kept well oiled and in good cutting condition to avoid pulling the grass or making unsightly skid marks if the ground is wet. Frequent light topping is much better for the lawn than occasional drastic cutting. Many gardeners believe that lawns should be limed, especially if they contain moss, but nothing could be further from the truth. The most useful grasses will grow under acid conditions that discourage moss, certain weeds, and worms, and the manuring of lawns should be designed to maintain the soil in an acid condition. Lime, of course, has the opposite effect, and should be used on lawns only under exceptional circumstances and with expert advice. Advice is given regularly in these notes about lawn manuring at the proper times of the year.

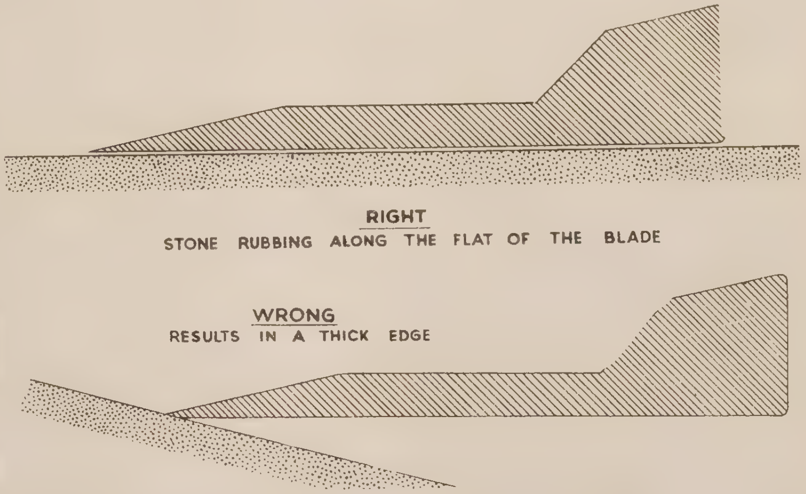
Planting of shrubs, trees, and herbaceous plants can be continued if the soil is in good condition and not too wet. A hole should be dug for each plant large enough to enable all the roots to be spread out fully and not bunched up, and the plants should always be set in their new positions at about the same depth as they were growing before—"nursery depth," as indicated by the soil marks on their stems. When planting in heavy soil it is best to dig the whole area over and not just excavate pockets into which the new plants are put. Such pockets tend to become waterlogged sumps into which surface water drains from the surrounding area. If the soil is very poor, it pays to plant each shrub or tree in a barrow-load of good soil brought in from elsewhere. In any case, the establishment of each new plant will be greatly helped by the application of a handful of blood and bone (or the complete flower border fertiliser often referred to in these notes) to each hole, mixing part of it into the bottom of the hole and the rest with the soil as it is returned, but preventing the fertiliser from coming into contact with the roots. Firm planting is most important and the soil must always be trodden firmly as it is replaced. If the soil is too wet to permit this to be done without churning it into mud, the plants should be heeled in and the work of planting postponed until conditions are more suitable.

Rose pruning should be completed this month except in very cold districts, where severe frosts might kill back the ends of rose branches and thus, in effect, prune them back still further. In those districts it is best not to prune roses until the end of August. Rose prunings and any of last year's leaves that can be raked together should be collected and burnt, as several troublesome rose diseases are spread by leaving them lying about. For ordinary garden work bush roses should not be pruned too hard, each main young shoot being left 6 to 12in. long. Old, dead, and weakly growths and all side shoots should be cut out altogether. Rose bushes required to produce exhibition blooms should be pruned much harder, but that results in fewer flowers and the bushes do not make nearly such a good display in the garden.

SHARPENING A REAP HOOK



Reap hooks are often ruined by incorrect sharpening, which results in a thick edge that will not cut properly. To make sure that the edge is sharpened at the correct angle the sharpening stone should move in constant contact with the shoulder of the blade as well as its edge. The user soon becomes adept at this with a little practice. The stone should not be put on the flat side of the blade at all except to remove any metal that has been burred over, and while this is being done the stone should be held perfectly flat on the blade.



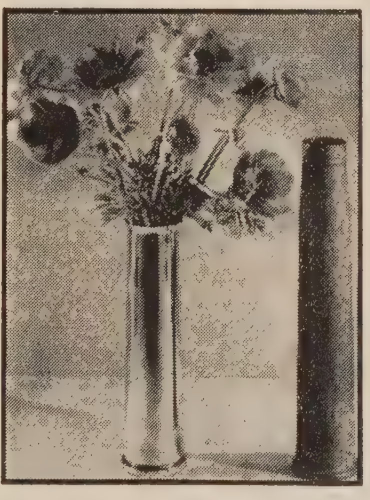
THE FLOWER GARDEN . .

Soil is the gardener's raw material, from which he hopes to produce a bright, colourful setting to his home and background to his life. Geology is therefore a subject which should appeal to the serious-minded gardener, whose study of the soil and its management will be helped by an understanding of how the soil was formed from the rocks which compose the crust of the earth. Many of the textbooks on geology are rather forbidding tomes, but home gardeners will enjoy reading "Earth Beneath," by Professor C. A. Cotton (published in Christchurch by Whitcombe and Tombs, 1945, price 8s. 6d.). The book, well illustrated with examples taken from familiar districts, shows what a happy hunting ground New Zealand can be to the amateur geologist, and helps to explain just how and why the New Zealand countryside has developed its present character.

Begonias make ideal showy plants for hanging baskets. The baskets, which can be made up in winter, are either constructed entirely of wire, which is woven so that the strands are 1in. or less apart, or can be made with a strong wire framework lined with wire netting. In either case the basket is lined with a layer of sphagnum moss and filled with good potting soil ready for the rooted begonia cuttings to be planted in the spring.

Sow seeds of the **slower-growing bedding plants** in boxes under glass, but only in the warmer districts. These seedlings should be ready to be pricked out in August or September, planted out in October, and be in flower by Christmas. Lobelias, *Begonia semperflorens*, petunias, antirrhinums, gaillardias, verbenas, and pansies take longer to grow, and should be sown several weeks earlier, than varieties like stocks, asters, and nemesias, and it is best to delay sowing warmth-loving plants like zinnias because it is too cold to plant them out until October in the north or November in the south. Seeds of hardy annuals can be sown in the open borders in mild northern districts, provided the soil is in suitable condition, but elsewhere it is still far too early to sow flower seeds outdoors. Alyssum Lilac Queen, pot marigolds, clarkias, godetias, cornflowers, sweet sultans, love-in-a-mist, larkspurs, and viscaria are all reliable hardy annuals that will flower well and for a long period if dead heads or fading flower spikes are cut off regularly, as described in the December issue.

Neat Vases Made from Old Shell-cases



[*Sparrow Industrial Pictures Ltd. photo.*

To display the natural beauty of floral exhibits as attractively as possible the blooms need to be arranged in vases which are neat and pleasing in design. Well-balanced, durable vases admirably suited to the purpose are being made by members of the Auckland Chrysanthemum and Dahlia Society from discarded 40mm. shell-cases. The vases are simply made, and in many societies this work could be done voluntarily by members.

One of the finished vases is shown alongside an old shell-case in the accompanying illustration. The vase is 9in. high and was cut down from a shell-case a little more than 12in. long. Heating was necessary to permit slight flaring of the upper rim, but with stronger equipment it is possible that the moulding might be accomplished without heat. Some of the vases leaked around the loosened percussion cap and required soldering.

Cleaning and polishing the finished vases are the most tedious work, but are less difficult than would be imagined. Fine emery paper will clean and smooth the metal to a surface condition which will take a brilliant polish.

In addition to their strength, durability, and fine appearance, the vases are given stability by their shape and weight. Polishing will be necessary each time the vases are used, but members of the society who will have to do this work will be fully compensated by the enhanced beauty of the exhibits displayed.

—*I. L. NOTTAGE,*
Orchard Instructor, Auckland.

Sweet pea seeds can still be sown in boxes in cold frames for planting out in spring, and plants can now be set out in mild districts—6in. apart for garden display or 12 to 15in. apart in the row if they are to be trained as cordons and grown for exhibition. Plants from the early sowings of sweet peas should now be growing strongly in warm districts and should be given short, bushy twigs as temporary supports or clipped with wire rings to canes where the tendrils have been removed from plants to be trained as cordons.

Thinning out is a most necessary part of garden routine work, as no plant can be expected to grow to perfection unless it has enough room. An overcrowded plant cannot display its full beauty, often has relatively few flowers which soon fade, and is unduly prone to the ravages of diseases and pests. Most home gardeners practise proper thinning of vegetable seedlings, having learnt by experience that an overcrowded row produces little for the table, but flower seedlings, especially annuals, are commonly left growing far too thickly. Reminders to thin out flower seedlings and herbaceous plants have been given in these notes at the proper seasons of the year. It is suggested that the winter is a good time to consider the thinning of shrubs and trees which grow ugly and leggy and lose their lower branches if they are overcrowded. Home gardeners usually plant shrubs and trees far too thickly, often with the good intention of removing some later, but the years soon slip by and the slowly-growing plants become such familiar figures in the garden that the thinning out of overgrown specimens is often left until it is too late and the permanent plants have been spoilt. Some winter day it is a good plan to look afresh at each shrub and tree growing in the garden, consider carefully whether it is still making a worth-while contribution to the general effect, and, if not, dig it out forthwith. It is astonishing how quickly its neighbours will refill the gap and how much better the remaining plants will look when they have ample room in which to develop.

Wet soil is in a particularly vulnerable condition. If it is trodden on or cultivated, it either goes into mud or kneads into a putty-like consistency, depending on its texture and degree of wetness. In both cases it loses the granulated, crumby structure which it is important to maintain if plants are to grow well. The crumb structure of the soil is strongest when it is in good "potting condition"—that is, if when a handful is squeezed and the hand opened again, the ball of soil does not fall to pieces or leave the hand wet, but just retains the impression of the fingers and cracks across in two or three places. In this condition the soil has the "optimum water content" for plant growth and can be cultivated or trodden on with least damaging effect to its crumb structure. It pays all gardeners (and, for that matter, commercial growers) to recognise this condition and as far as possible avoid disturbing the soil when it is wetter than good "potting condition." Similarly, when the soil is drier than "potting condition" the use of mechanical tillage equipment can be equally damaging, as the crumbs may then be pulverised and the soil poach badly when next rain falls.

Reminders About Common Troubles

Subterranean grass caterpillar: Last July the Horticulture Division received many inquiries from home gardeners whose lawns were showing bare places in which could be seen a number of holes about the size of a pencil. This damage is caused by the long, greasy, subterranean grass caterpillars (porina), which live in the holes and come to the surface at night to feed on the grass. The pest is most easily controlled by using a poison bait, made up of 1oz. of Paris green or 2oz. of arsenate of lead, mixed with about 1½lb. of bran or porridge oats, moistened to a crumbly consistency with sweetened water, and scattered evenly over the lawn in fine warm weather. This quantity is sufficient to treat 1500 to 1800 square feet of surface. The most effective time to use the bait is from January to March, when the caterpillars are still quite small and before they have had time to do any serious damage. The bait is much less effective if used now, because the caterpillars may become dormant and cease to feed, and in any case poisoning the caterpillars after they have ruined the lawn is rather like locking the stable door after the horse is gone. Paris green and lead arsenate are both very poisonous and must be handled with care.

[Douglas Elliott photo.

Witch hazel *(Hamamelis mollis)* is one of the few shrubs which flower in mid-winter. The plant being deciduous, the curious, sweetly-scented, yellow flowers look all the more attractive because they are borne on branches bare of leaves at the time the flowers are out.

Slaters or woodlice are not insects but crustaceans, belonging to the same group of animals as the crayfish. They have grey, oval, armoured bodies and can roll into a ball when disturbed. Woodlice normally do not eat growing plants, but may be forced to do so if they become too numerous to be supported on the natural supply of decaying rubbish. They are not easy to control, but one fairly successful way is to use the Paris green bait described for subterranean grass caterpillars sprinkled thinly about in places which they frequent. Equally important is keeping the garden tidy, destroying old rubbish in which woodlice love to congregate and where they multiply. D.D.T. powder, scattered in places where woodlice may shelter, has also been stated to control the pest.

Violet leaf spot (caused by the fungus *Phyllosticta violae*) is a common complaint of violets, which can be seriously affected in spells of mild, damp weather. Spotted leaves should be removed when noticed and badly-affected plants dug out and burnt. Several applications of Bordeaux mixture (3:4:50) at intervals of 10 to 14 days will control the disease, but normally spraying is not necessary in home gardens if the precautions suggested are taken promptly.

Other Tasks for the Month

Make a final thinning, to 8 to 9in. apart, of **annuals** sown in the borders in autumn.

Continue setting out **bedding plants** when the soil is suitable in mild districts.

Water **bowls of bulbs** sparingly until the flower buds can be seen.

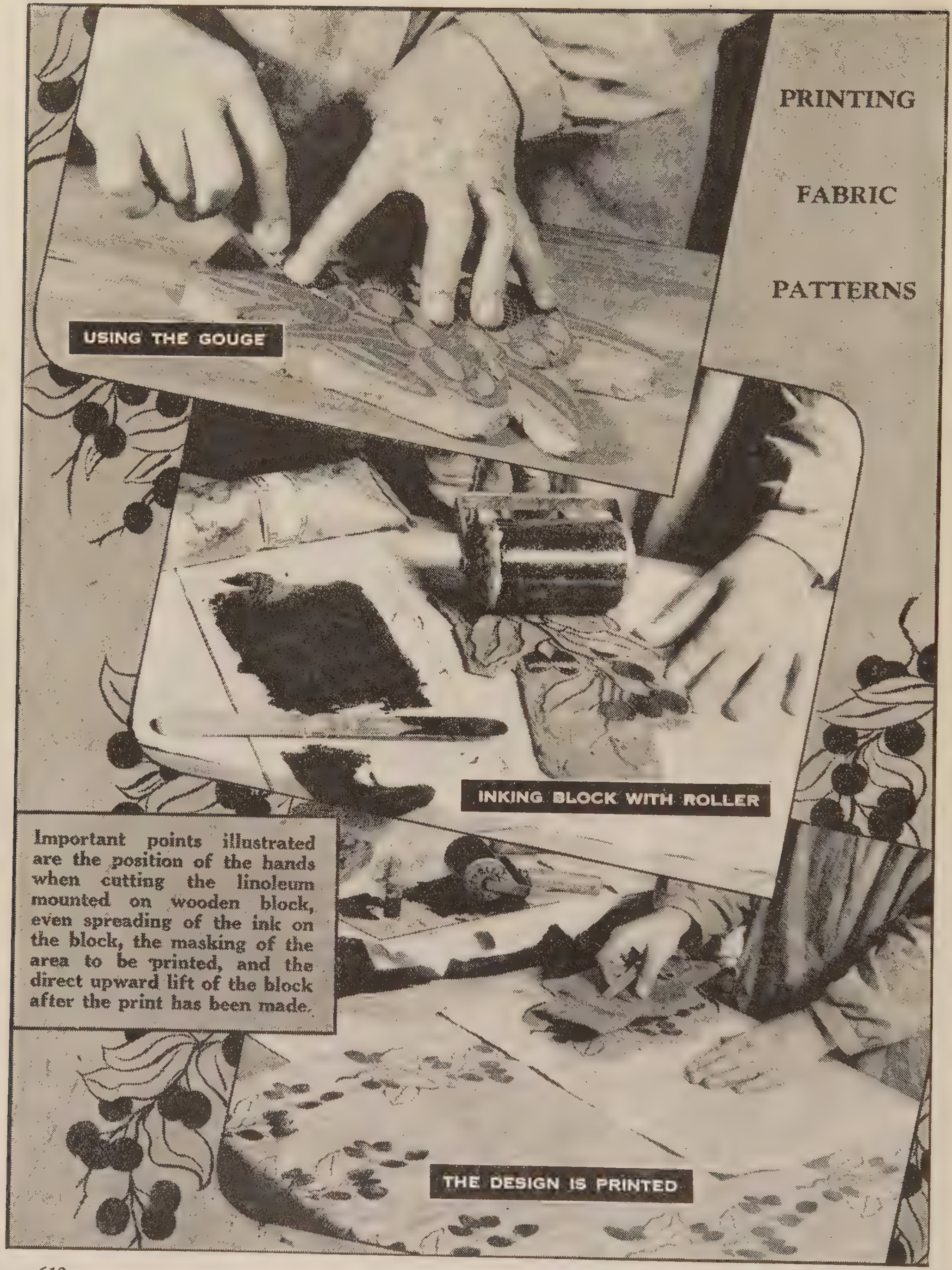
Cuttings of perpetual-flowering **carnations** can be taken under glass.

Aerate **lawns** by digging a garden fork into the surface every few inches and withdrawing it without tearing the turf.

Remove old dead leaves from **tree ferns** and put a layer of compost over their hills of roots.

Continue pulling **weeds** by hand or digging them in. Few will die if left lying on the surface in winter.

PRINTING FABRIC PATTERNS



USING THE GOUGE

INKING BLOCK WITH ROLLER

THE DESIGN IS PRINTED

Important points illustrated are the position of the hands when cutting the linoleum mounted on wooden block, even spreading of the ink on the block, the masking of the area to be printed, and the direct upward lift of the block after the print has been made.

Fascinating Fabric Patterns from LINOLEUM BLOCKS

SOMETHING different, individual, and entirely exclusive to the wearer or owner may be made by printing at home on materials and paper from patterns cut on linoleum blocks. Some of the attractive patterns and designs achieved are illustrated on these pages, and in this article Louise Tilsley describes how with the expenditure of a little time and trouble the skill to cut the patterns on the linoleum blocks and to make the simple equipment required may be gained.

IT is not very difficult even for the mere tyro at drawing to produce with a linoleum block a pleasing and simple design on material, because repetition in various positions of a simple unit like a heart or a diamond copied on to a block from a playing card will enable the ringing of a number of fascinating changes. On the other hand, for a person with a flair for drawing there is no end to the interest that this art craft will give.

A child often presses a piece of paper on to a penny, rubs it, and when he lifts off the paper an impression of the engraving of the coin is stamped on it. Natives in the Pacific Islands using primitive methods make very effective patterns just by pressing leaves to the surface of their fabrics and painting dyes on the parts not covered by the leaves. The shapes of the leaves remain the original colour of the fabric and give a very striking and pleasing design.

As in most New Zealand schools children are being made familiar with linoleum as a cutting material, to many people the use of this easy-to-cut medium will not be new.

Choice of Design

The choice of a unit easy to cut on the linoleum block is often the hardest part for the beginner. The first design selected must be very simple and easy to cut in linoleum; as confidence is gained a more difficult design or pattern may be attempted. At first a simple unit, such as the seed of a manuka flower, which may be found in almost any part of the country, should be chosen. It should be drawn so that it will be easy to cut with the tool but at the same time make an effective pattern when repeated. As there are many ways in which a unit may be turned and twisted to make a change in pattern, it is not necessary to make on the block a decorative composition; a flower and a stalk drawn realistically will make a pattern when repeated.

In Fig. 1 there is a simple example of the manuka seed drawn in two parts with a few leaves and reproduced on a linoleum block. It will be seen that the parts do not touch each other, making it easy to cut with the tool.

Linoleum

The type of linoleum one should try to get is the hard, plain kind commonly used on office floors. It may be of any colour. If there is a pattern on it, the surface should be covered with white poster paint or thick water colour and left to dry, when the unit or flower or picture design may be drawn on it with a pencil. If this is too difficult, a tracing may be taken and carbon paper used under the tracing to redraw the design on the linoleum. It is not necessary to reverse the drawing for a single unit unless it is required to print exactly as in the first drawing. A

Photographs on opposite page and in heading by Sparrow Industrial Pictures Ltd.

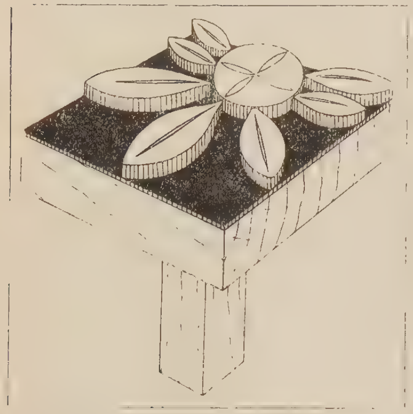


Fig. 1—A single repeat unit of a manuka seed and a few leaves.

scene, of course, must be traced in reverse upon the linoleum if it is to come up the right way on the print.

The next step is to glue the linoleum on to a piece of wood no smaller but perhaps a little larger than the drawing; any solid wood will do. Leave overnight to stick firmly under pressure. There is generally a hessian back to the linoleum, and if this will tear off easily it should be removed before the linoleum is glued to the wood, as sometimes it will show through a deep cut in the linoleum and blur a good print if it happens to catch the ink.

Glass Palette

Ink for the rollers or dabbers used for inking the linoleum blocks may be spread on a piece of plate glass, any odd piece of clean glass, or even a large flat china plate or smooth board.

Ink Rollers or Dabbers

A squeegee or photographic roller is necessary to roll the ink on to the surface of the block evenly. If a roller of this type is not obtainable, a home-made dabber should be used (see Fig. 2). A dabber is necessary, too, if a very small area is to be covered with ink. A small lump of cottonwool or odd pieces of fleece wool tied into a little knob with a piece of silk, cotton, or string makes a good dabber. As the dabber must not be woolly on the outside, it is important to use a silky material without nap on it. As dabbers are thrown away after use, a box of them should be made before starting on a job, and new ones made for each job.

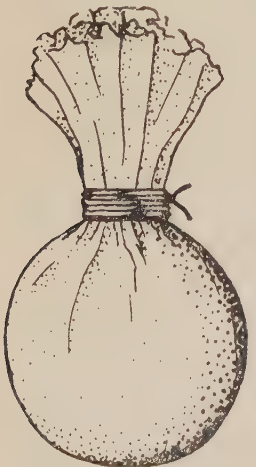


Fig. 2—Dabber.

Printing Inks

Special inks are now manufactured for fabric printing and are tested for durability and resistance to light and washing. If these inks, which are put up in lead tubes by manufacturers of printers' ink in New Zealand, are unobtainable, ordinary printers' ink, which is very thick, may be used. Though printers' ink will stand up to being washed, it is not as durable as fabric ink.

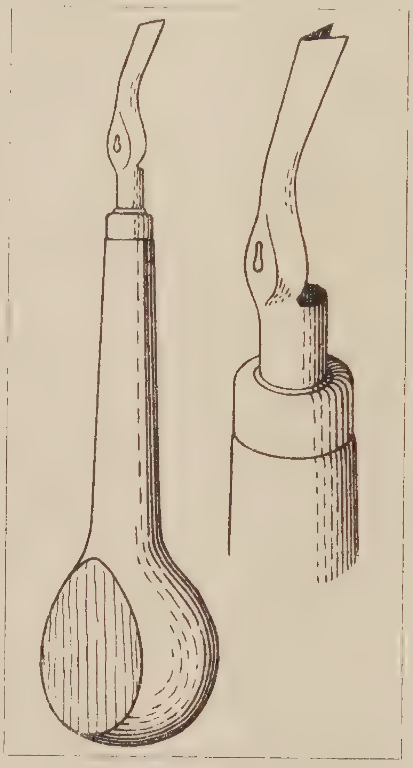


Fig. 3—Linoleum tool fitted with a V-shaped nib.

Small quantities of printers' ink in, say, the three primary colours, red, blue, and yellow, also a little white and less black, may be bought from a printing office if small pots such as face cream jars are supplied. The white pigment can be used to mix with and bring down the three primary colours to any desired shade. If it is possible to obtain fabric inks, those put up in tubes should be asked for, as the ink keeps better if the screw top is kept on. If the ink is in round tins, the lids should be kept on and after use the space between the ink and the lid should be filled with water to help to keep the ink soft. The water can be poured off before using the ink each time.

Unused ink left on the palette because of interruption of printing or because too much was put out for the job should be lifted with the palette knife and put on to a piece of thick paper, which, if folded over with the ink inside, will keep the ink clean and useable for some time. When the paper is opened out the skin on the ink will be next to the paper. If exposed to the air all these inks form a thick skin, which must be removed before the ink is used.

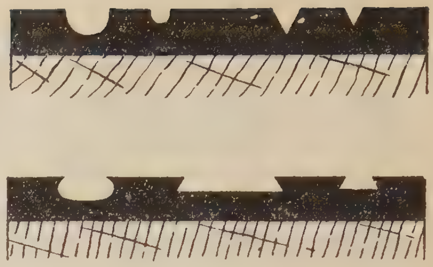


Fig. 4—End sections of linoleum blocks showing (top) good and (bottom) bad tool cuts. In the top figure the two hollows on the left were cut with a round gouge and the two on the right with a V-shaped gouge.

Any oil paint may be used to print on parchment papers for lampshades, etc. If trouble is found in making water colour paint stick to the oily surface of the linoleum block, the paint should be mixed with a paste made of thick starch. Printers' ink is used for all types of paper. (Pads of felt are used to carry dye to the printing block, but as dyes are almost unprocurable here, only the colour mediums mentioned are recommended.)

Gouges or Cutting Tools

Fig. 3 shows the type of tool or gouge obtainable at most stationery shops and from firms selling artists' paints. From some firms a set of different nibs for use in the holder may be obtained. There are usually two V nibs in the set, one wide and one narrow; the wider one is best for general use. If it is not possible to buy a linoleum tool, a penknife may be used. With a penknife two cuts

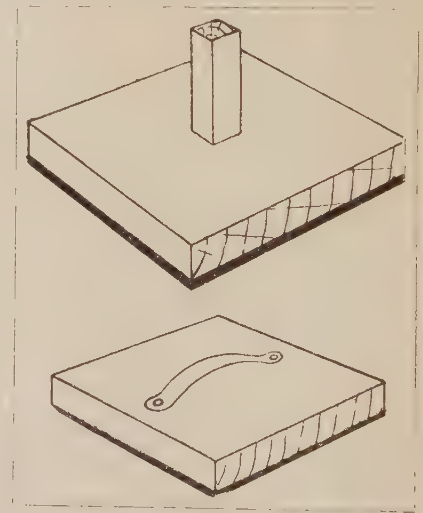


Fig. 5—Wooden handle (top) and leather strip handle (bottom) fitted to linoleum blocks.

[*Sparrow Industrial Pictures Ltd. photo.*

The skirt, curtain, head scarves, and tea shower illustrated show some of the attractive patterns which may be hand printed on fabrics to lend charm and individuality to personal and household possessions. The kowhai sprays on the organdi background are printed in yellow and green.

must be made to remove from the linoleum the same peeling that the V-shaped gouge makes with one cut. The edges of the design or unit may at first seem ragged, but confidence in cutting should come when a second attempt is made, and however bad the result may be, it will look better when printed. There is also a liner nib with the set and a rounded gouge nib; the liner takes the place of a penknife to make the first cut round the line and the round gouge takes out big areas. For the beginner the larger V gouge is safest to use, as it gives easily the right printing edge—a line with a wider base (see Fig. 4). Should either tool be unprocurable, a spoke of an old umbrella sharpened on an oil stone at one end and the other end fitted into a handle will do.

The tool used must always be sharp, and a small sharpening stone or carborundum stick should be at hand; in this soft stone a groove is made for the V gouge and it is sharpened by drawing the cutting edge down one way only.

Cutting the Linoleum Block

The cutting of the linoleum block is the most important part of the preparation for printing. An illustration on page 612 shows how to hold the tool in the hand, and Fig. 4 shows the cut when made, looking edge on to the trench in the linoleum. At first less than is required should be cut away, as it is difficult to replace and easy to cut more away later. A piece of tissue paper should be kept handy to place down on the linoleum to take an impression of the work as it proceeds by rubbing pencil-lead on a finger, then rubbing the finger over the tissue on the block, as the child does to see the impression of a penny. Dust off all peelings and finish the cutting. All the parts left in compose the printing surface, which is the reverse of a stencil, where the cut-out part is the area that takes the colour. Cut away all the outside edges of the linoleum to the wood where possible, and leave on the block only the parts composing the raised printing surface. Saw off all unnecessary edges of wood at corners, and smooth rough saw edges with sandpaper.

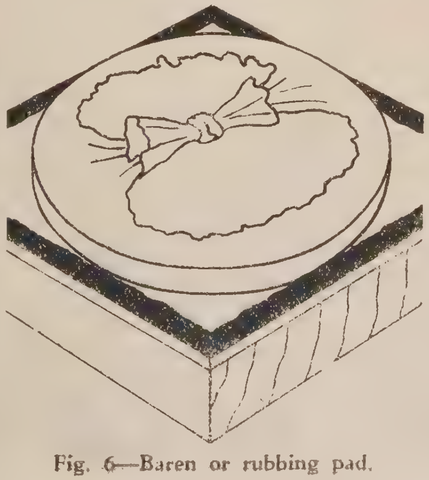


Fig. 6—Baren or rubbing pad.

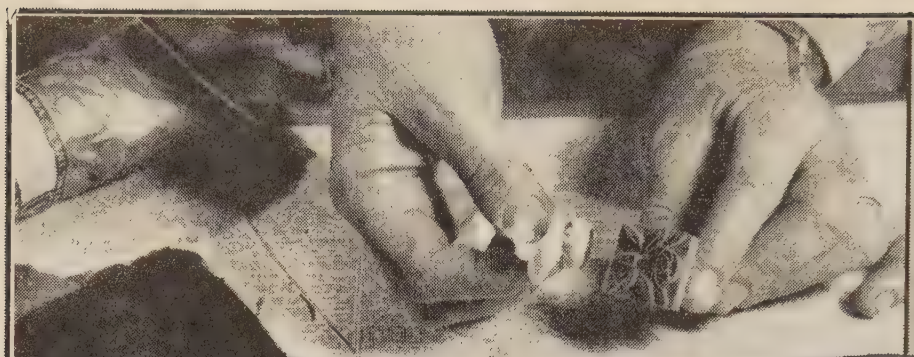
A piece of tape, a strip of leather, or a smaller block of wood tacked or nailed to the back of the block makes a suitable handle. A strip of leather on the back is best for large blocks, as it does not interfere with the pressing down of the block, which, to save the hands and to get an even imprint, is done by tapping gently but firmly with a hammer or wooden mallet (see Fig. 5).

Pressing Pad or Baren

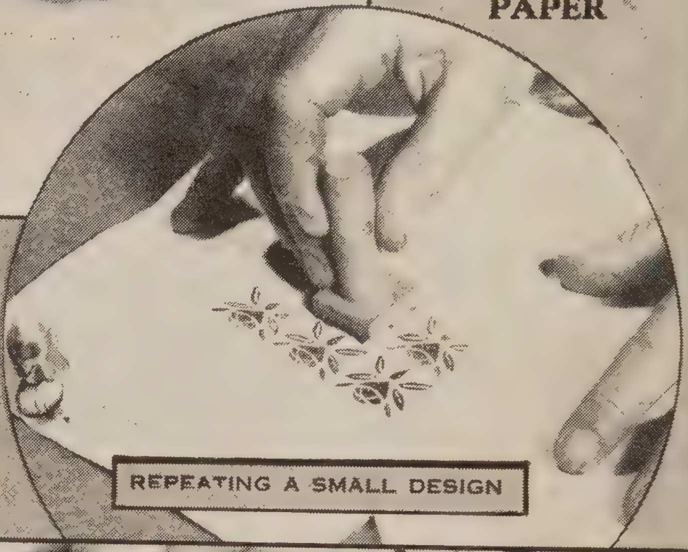
To take off single prints of a design to be treated as a pictorial composition, an ex libris print, stamp name, or initials, etc., handles are not necessary. The block used for fabric printing or printing on large paper areas is inked and pressed face down on the material, but the block to be used as a picture, etc., is inked and the paper placed upon the inked surface, while pressure is made by friction across the back of the sheet with a pressing pad, or baren, to carry the impression from the block to the paper.

Fig. 6 shows a home-made baren, which may be simply made from a round lid whose flat surface is covered neatly with cardboard, over which some non-fluffy material like silk is placed so that it comes right round

PRINTING PATTERNS ON PAPER

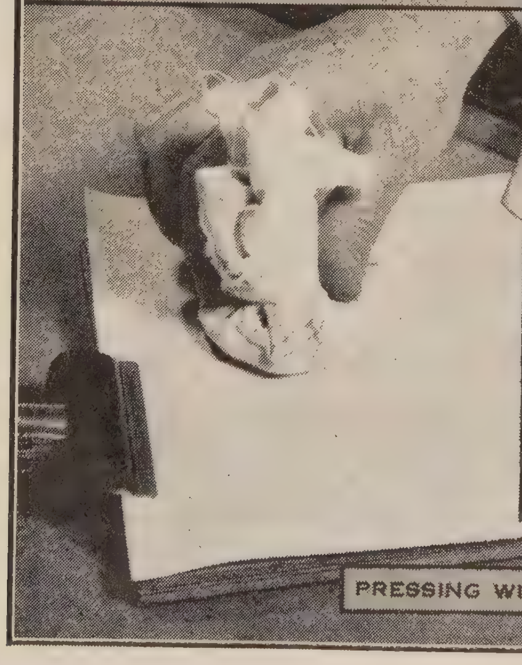


USING THE DABBER

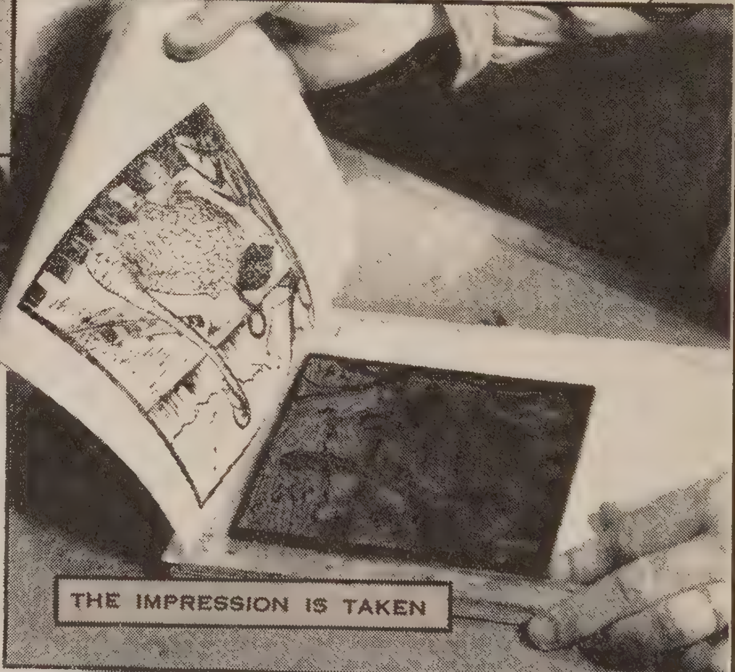


REPEATING A SMALL DESIGN

In the two upper illustrations the small design is inked with the dabber kept handy for re-inking as the design is repeated on a book cover. At lower left pressure with the baren transfers the design from block to paper, which is kept steady with the paper clip during printing. A gentle, steady pull is required when lifting the printed paper from the surface of the block.



PRESSING WITH THE BAREN



THE IMPRESSION IS TAKEN

[*Photographs by Sparrow Industrial Pictures Ltd*

at the back or hollow part of the lid to tie and form a handle. Some printers use the back of the handle of a large tablespoon to make even pressure, placing an extra sheet of paper between the spoon and the sheet to be printed.

Printing Table

The table used for printing should be large enough to take a good portion of the material or paper at a time and should be covered with several thicknesses of old blanket or any kind of smooth felt. There must be no lumps or holes in the surface. The felt should be covered with several sheets of newspaper and the material or paper to be printed should be spread on the newspaper and held in position with small pins if it is inclined to slip or move. It is a good plan while printing to use a mask made by cutting out of cardboard a hole a little larger than the block. Though the use of a mask is not necessary, it sometimes saves marring of areas beyond the design by finger marks or by the block, when inked, falling accidentally on the material. A clean piece of rag should always be carried in the smock pocket to wipe away quickly any odd splashes of ink, and odd pieces of cut-up newsprint should be kept handy to place under an impression if the printing has to be moved. If odd blots of ink fall on the printing table, they should be dusted with cornflour or talcum powder immediately.

Kerosene is best for cleaning blocks, and an old toothbrush serves to get the ink out of the grooves. Always clean up immediately work is finished and never leave ink overnight on blocks or rollers. Keep a supply of old cleaning rags available.

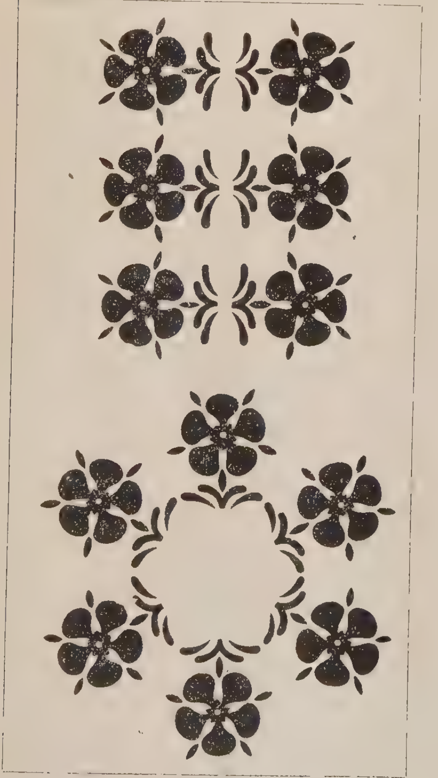


Fig. 7—Patterns formed by repeating the simple block of a manuka flower.

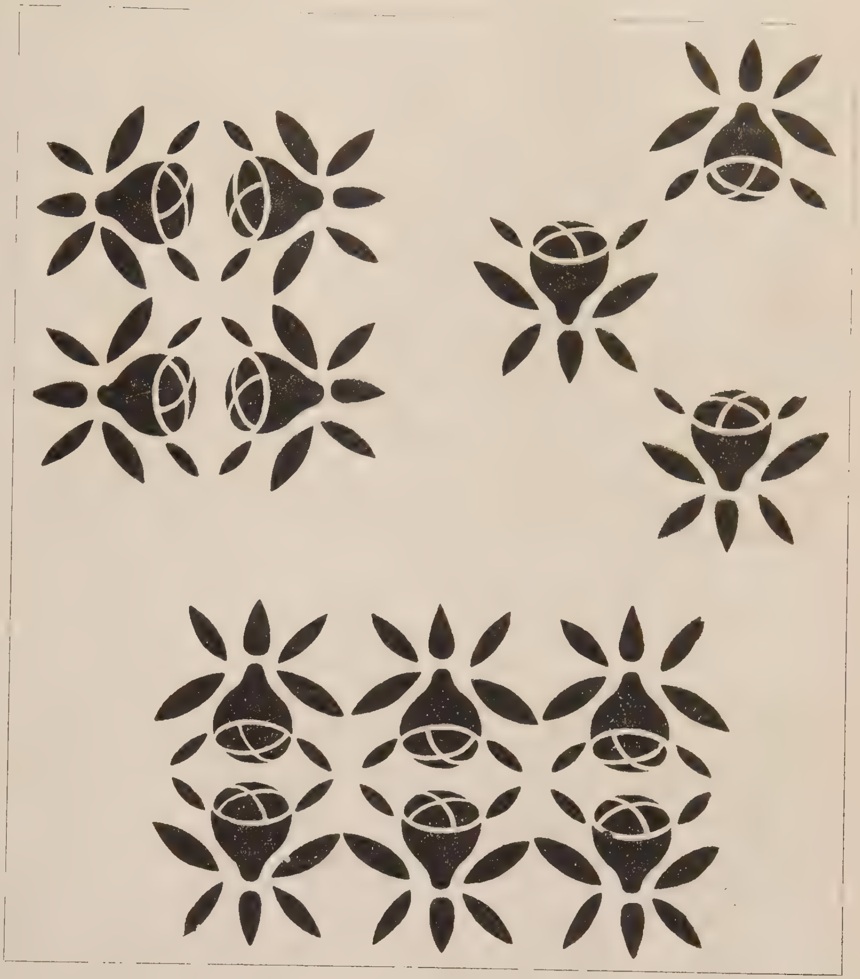


Fig. 8—Various patterns formed by repeating one unit in different positions.

To Print

Having everything handy, with the block ready, the first thing to do is to decide on the colour or colours to be used, so a trial print must be made. To do this place an odd piece of the same paper or material to be used on the printing table. Roll out some ink on to the glass palette; put the greater part of it to one side, leaving a little to roll the squeegee on or to press the dabber into; then pass the inked roller up and down and from side to side across the block. When the block is loaded evenly with ink—it is important to wipe off all smears on the sides of the block—turn the inked block face down on the spot to receive the impression, press evenly but firmly with the right hand (or tap with the mallet), then lift off the block with a careful upward motion, holding the material being printed on firmly in place on the printing table with the left hand. If the colour is right and there are no errors in the cutting, printing may proceed in the same manner on the rest of the material or paper, the block being inked evenly for each impression.

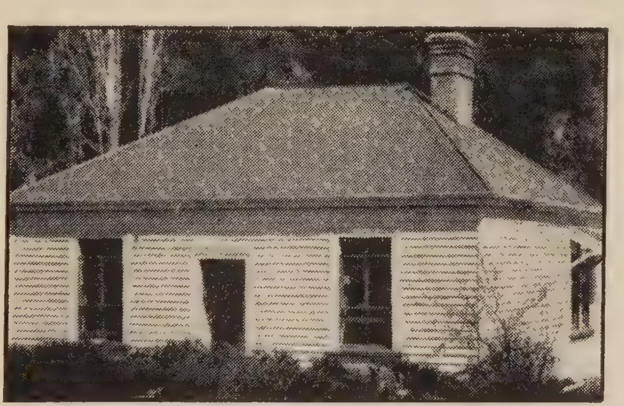
Absorbent papers dry quickly, but drying depends on the ink and the weather. Materials should be left at least three days to dry, and very thick fabrics require longer. Materials with raised surfaces are not good or easy to print on, but even coarse sacking will take an impression if the pressure on the block is strong enough. Materials printed with fabric inks may be washed over and over again; washing tends to soften the ink and often improves the impression.

Two or more colours may be used simultaneously on the one block if the colours are not touching and if the dabbers used for each colour are small enough. For example, green may be used for leaves and yellow for flowers on the one unit if there is a space between leaves and flowers on the block. These variations will be easily understood and mastered with practice and will lead to interesting experiments in more ambitious printing with linoleum blocks.

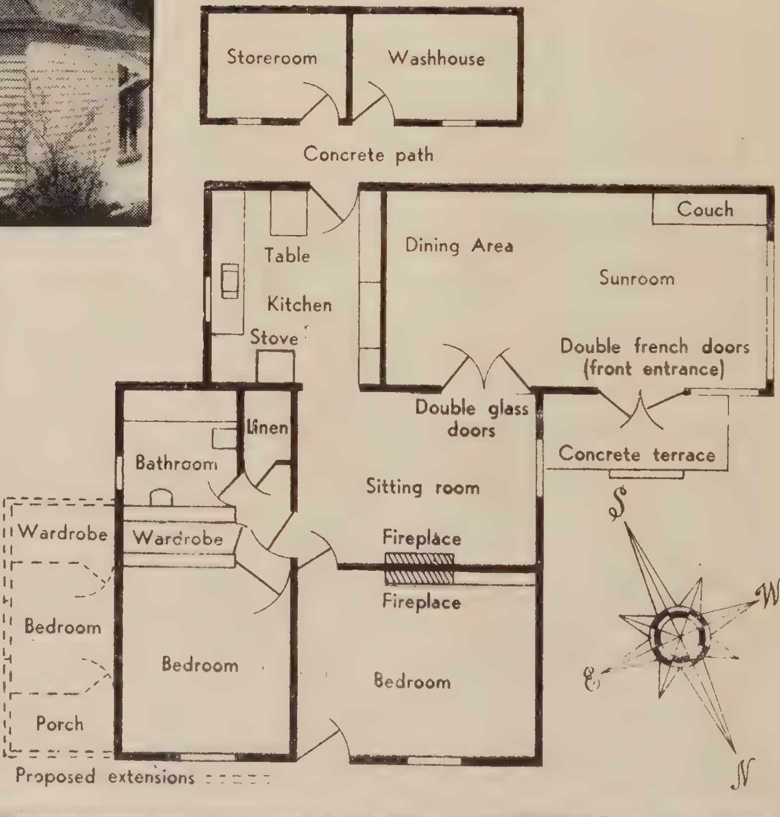
A LIGHT AND SPACIOUS INTERIOR

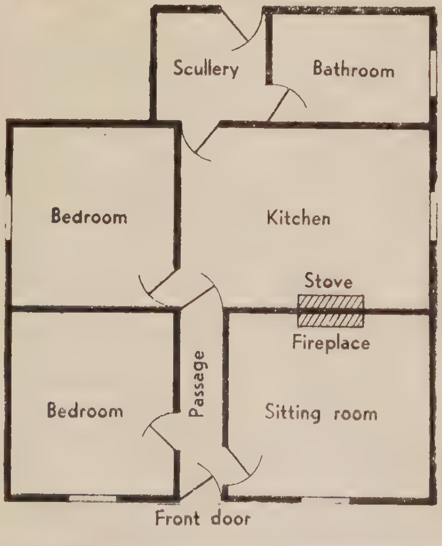
Two views of the window end of the new sunroom.

THE OLD PLAN AND THE NEW



Left—A photograph and plan of the original cottage. Below—The plan of the modernised house and the proposed extensions.


Storeroom
Washhouse
Concrete path
Table
Kitchen
Stove
Dining Area
Couch
Sunroom
Double french doors (front entrance)
Double glass doors
Concrete terrace
Linen
Bathroom
Wardrobe
Wardrobe
Sitting room
Fireplace
Fireplace
Bedroom
Bedroom
Bedroom
Porch
Proposed extensions - - - - -
S
W
E
N


Scullery
Bathroom
Bedroom
Kitchen
Stove
Fireplace
Bedroom
Passage
Sitting room
Front door

Extending and Modernising a Four-roomed Cottage

ONE way in which the square cottage built in such numbers in New Zealand from about 1880 onward, and still existing in large numbers, can be adapted to twentieth-century ideas of living by additions and rearrangement of rooms is described in this article by Dorothy Johnson, Rural Sociologist, Christchurch.

SUCH a cottage is a familiar sight and many New Zealanders have lived in them at some time in their lives. As it is, it still meets satisfactorily a large number of people's housing requirements and may even represent a highly-desired goal to those without a home. But its potentialities as the setting for the needs of a young and growing country family given to hospitality are very small. The alterations to the cottage described in this article were made when building materials were not abundant, and the result was achieved at a cost which would have built but a small part of a new house. In fact, the additions could at any time form the nucleus of a new house, though the owners at present are so satisfied that they contemplate a further extension to the older part of the cottage when possible.

The sunroom, projecting beyond the west wall of the old kitchen.

Portion of the new sitting room.

The lean-to of the cottage before alterations, containing a scullery and a bathroom, was pulled down and in its place two larger rooms were built, projecting about 12ft. beyond the west wall of the old kitchen. This projecting end became a sunroom, with large windows to within a foot of the floor on the north and west sides. Large double french doors on the north side lead to a wide concrete step or terrace and thence to the lawn, the whole forming a delightfully-sunny afternoon recreation place and extending the living space from indoors to outdoors happily and easily. These french doors are the new front entrance to the house.

The other end of the sunroom, which is 24ft. by 12ft., is the dining area. A double storage wall separates it from the new kitchen, with cupboard doors and drawers opening on both sides. The new kitchen, which is 10ft. by 12ft., has an electric storage cooker at one end and a breakfast corner near the door. A home-made wire rack is fixed to the wall above the cooker for airing clothes, and is fastened by a catch to the wall when not in use. Even the transport handles on the side of the stove are given a double usefulness by a small shelf supported on them and used to dry and warm the shoes and slippers of the younger members of the family.

The new kitchen has a door to the old kitchen, which is now the sitting room. The coal stove has been replaced by a brick open fireplace, but the wooden dado has been retained

MODERNISING A COTTAGE

Sunroom, concrete terrace, and north-west suntrap formed by the angle of the house provide a safe, warm place for children to play in any weather.

Between sitting room and sunroom is another pair of double french doors, which add considerable light to the sitting room.

The result of this careful though simple planning of the living area of the house is that it meets successfully all the needs of the family, giving maximum space, air, sunlight, and ease of movement.

There is a sunny and safe place for small children to play indoors and outdoors which is easily observable from the sitting room window or through the slide to the kitchen. Meals can be prepared and served with a minimum of walking about. The new sitting room is easily heated in the colder weather and the sun warms the larger room. Though the house is small, entertaining even large numbers is pleasant — 30 people have celebrated a birthday there. The double french doors between the two living rooms and again between the sunroom and the lawn make for easy movement to and fro and, with the sun pouring through the large windows, give the appearance of spaciousness and light that is usually associated only with much larger structures.

Rearrangement of Rooms

The original sitting room has become the main bedroom, with a wall removed to take in the original front passage, making a better-sized double room. The door to the outside has been retained, giving ease of egress and producing currents of air through the house in hot weather. The original front bedroom is the guest room, with the door moved to open into the room behind it. That room, once a bedroom, has been subdivided to provide all the rest of the necessary amenities of a modern house. It contains bathroom and lavatory; a linen press over the new electric hot water cylinder; a large walk-in wardrobe or wardrobe room, which with shelves, rails, and pegs on both sides suffices for the whole family; and a small passage which connects them all and the front bedroom to the rest of the house through the sitting room.

Each alteration has a thought-out purpose in the scheme of living. Those parts of the old cottage which have usefulness have been retained for the present. The financial resources available have been used for the fundamental structural alterations desired and the resulting plan shows the house divided into functional areas for different aspects of living. The rooms for the preparation of food, dining, recreation, and entertainment are grouped together, and those for sleeping are grouped round the toilet facilities. This is still true for the proposed additions and marks a good plan. In many additions or alterations there arises the difficulty of using the workroom of one aspect of living (for example, kitchen or sitting room) as the passageway to rooms of different function (bathroom or bedroom).

Perhaps later the old windows will be lengthened to match the new ones and alter the outside appearance, and the wooden dado in the sitting room may be replaced when the younger members have lost the desire to leave their finger imprints on the walls; for the present it is highly functional and in harmony.

The old sitting room, now the main bedroom, has a built-in dressing and clothes unit beside the fireplace and a mirror on the adjacent wall. That makes it possible to use all the floor space, beds and chairs or stools being the only movable furniture.

To make a light background to the furnishings and decorations the walls and ceilings throughout the house are coloured cream.

Plans for the Future

A new bedroom is now required, and it is proposed to build one beyond the present guest room. The family wardrobe will be moved to the end of the new room and the present one will be the passageway to bedroom and wardrobe, though probably as a passage it could still retain storage fitments along one wall. A small playing porch could be allowed for, which would have the advantage of the sun up to midday or later and outdoor space sheltered from north-west gales, which can be severe in the area.

This is but one variation of the possibilities of a country cottage built for one generation's needs and adapted to the needs and living standards of another which is facing the responsibilities of rearing the third generation —and it is delightful. It is hoped that readers will offer examples of other successful adaptations, which would contribute to building up a true picture of one important aspect of New Zealand rural living, and also would offer suggestions and help to many who contemplate doing likewise.

A corner of the old sitting room, now the main bedroom.

LAUNDRY LAYOUT

By NORMA K. METSON, *Rural Sociologist, Wellington.*

ANYONE fortunate enough to have an automatic washer, a heated drying cabinet, unlimited hot water, and a small household can keep the "laundry" in a corner of the kitchen and forget about it for six days out of seven. But that is not the usual situation, especially on a farm.

WASHING clothes is one of the heaviest domestic tasks, and many women find it unpleasant as well as tiring. A well-equipped laundry will do much to lighten the work, but in many homes, even though much care and thought are lavished on the kitchen and its equipment, the laundry remains a place of gloom and despair.

More often than not it is a detached building. It may be joined to the house by a reasonably-dry path of gravel or concrete, or separated by a wilderness of mud and long grass. No hot water except what is heated in the copper, copper and tubs widely separated so that heavy and dangerous carrying of hot clothes is required, and a clutter of all the odds and ends of the farm from fowl feed to lawnmower—is that not an all-too-familiar picture?

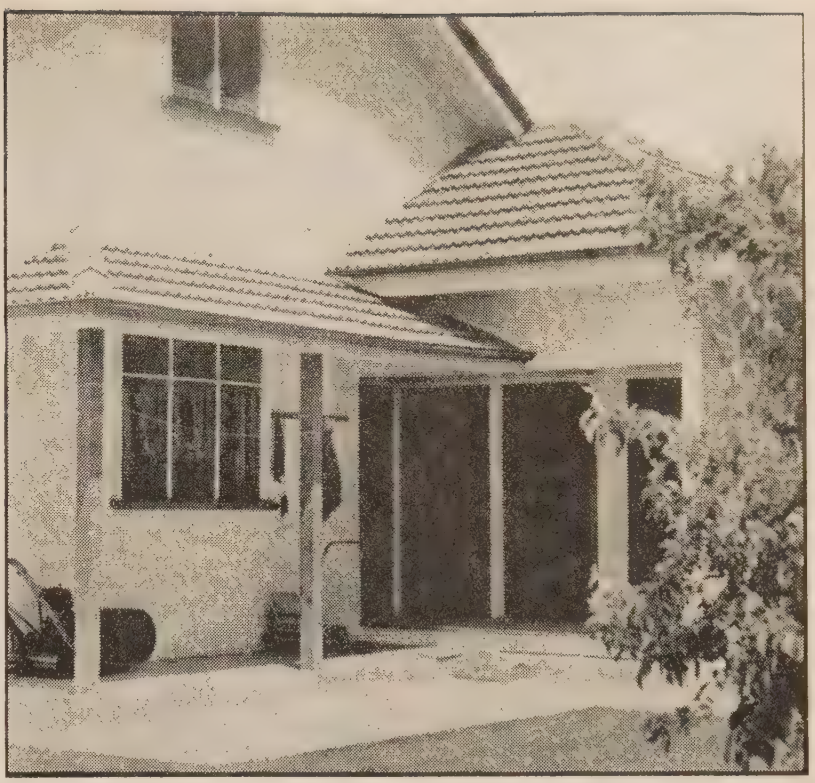
One Use or Many?

As with other rooms, it is first necessary to decide, as far as possible, what this room is to be used for — clothes washing, of course, but clothes washing alone, or washing and other things?

Copper and tubs can, if necessary, be fitted into a minimum space, but on a farm it is usually convenient to have a larger room. This may be treated as an adjunct to the kitchen with cupboards planned for preserved foods, fresh fruits and vegetables, and bulk supplies of staples. Churn and separator for family use can be kept there, and a room of this type can be similar to the kitchen in colour scheme and appearance.

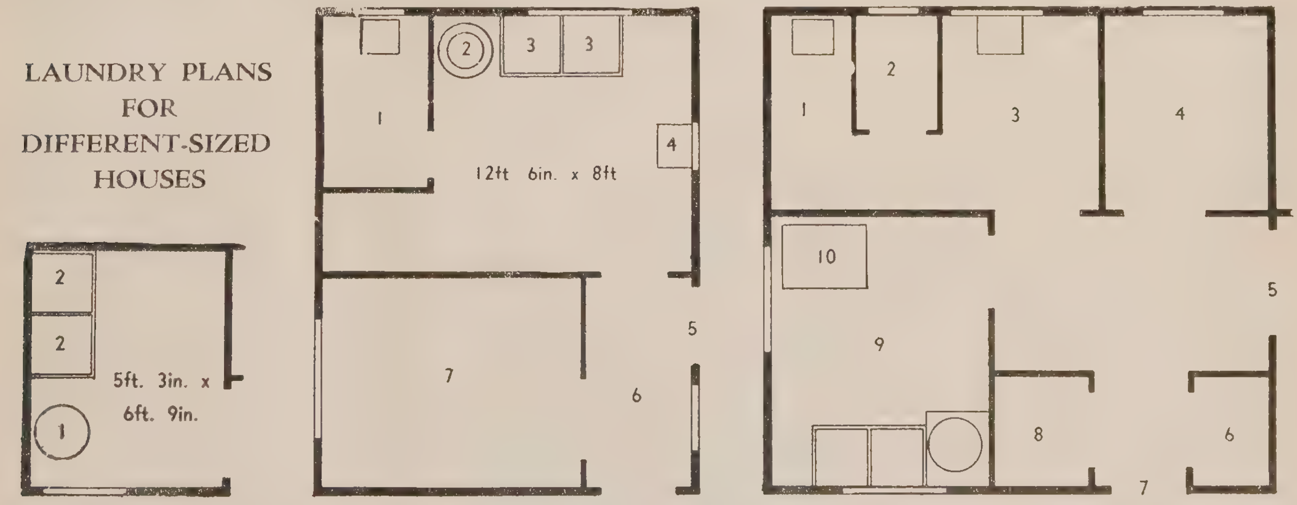
Sewing and ironing are another set of related uses. It is often desirable to keep all the laundry processes in one room, while the handiness of the iron and a convenient table or bench make easy the arranging of an efficient sewing centre where making and mending can be done. In this case cupboards are needed for linen, sewing supplies and materials, and the ironing equipment.

Many houses are planned so that the laundry serves as the back entrance. In that case it is wise to make provision for coats, boots, and cleaning up.


[Barwell Studios photo.

The back entrance of a farm house. The doors, from the left, lead to the basement, the laundry, and the washroom and lavatory.

LAUNDRY PLANS FOR DIFFERENT-SIZED HOUSES



Left—The minimum laundry. 1—Copper. 2—Tubs. Centre—Combined laundry and washroom with space for clothes storage and later installation of a shower. 1—Lavatory. 2—Washing machine. 3—Tubs. 4—Basin. 5—Back door. 6—Back passage. 7—Storeroom. Right—Service wing of a large house. 1—Lavatory. 2—Shower. 3—Washroom. 4—Storeroom. 5—Door to house. 6—Wood storage. 7—Back door. 8—Coal storage. 9—Laundry. 10—Ironing table.

LAYOUT OF LAUNDRIES . . .

The simplest arrangement is a wash basin and a row of hooks, but the room could be big enough to allow a shower and lavatory to be installed later, together with a drying cupboard for wet outdoor clothes and racks for boots and shoes.

Finally, there is no reason why the fowl feed, lawnmower, tools, bicycles, or gardening supplies should not be kept in the laundry, if it has been designed to accommodate them. They become a nuisance only when they hinder the worker by encroaching on her working space or bringing in a dangerous amount of dirt.

Light and Ventilation

The laundry is usually built on the south side of the house—other rooms will benefit more from the sunshine—but it must be well lit and adequately ventilated. A 4ft. width of windows above or at the end of the tubs will give enough daylight, and the door, or another window on an opposite wall, will secure cross-ventilation. A hood over the copper and windows which reach nearly to the ceiling and can be opened at the top will keep steam cleared away; this point is specially important if the room is to be used for storage of food or clothing, as continued dampness could cause deterioration. The room will be much lighter if walls and ceiling are painted cream, but if that is impracticable because of heavy wear, natural wood colours are preferable to dark stains.

Copper or Washing Machine?

The copper-washing machine argument is one which is still heard. Old houses had coppers because all water had to be heated in them. Now the laundry is part of the house, and hot water from the central system is piped to the tubs. The copper, however, is still useful for providing extra hot water and for cleaning the clothes by boiling and sterilisation. A washing machine requires hot but not boiling water, which can be drawn direct from the taps if the house supply is adequate. The standard equipment is two tubs, but a third may be useful in a large household or for the attachment of a water-driven centrifugal drier which can be installed if there is a plentiful supply of cold water under pressure.

Tubs and copper should always be built in a straight line and adjacent, so that lifting of the clothes is minimised. A washing machine needs a place for storage against the wall and clearance room so that it can be wheeled out in front of the tubs for use. At least one electric point is required, and this should be placed most conveniently for using the washing machine; undue length of flex is dangerous for this damp work.

Where there is no washing machine the point will still be useful for operating an iron, an electric jug for starch making, or other equipment.

Storage Space

Laundry supplies such as starch, soda, blue, and soap powders need a separate small cupboard; 6in. shelves are deep enough, and such a cupboard can be built into the wall convenient to the tubs. Clothes pegs, starch basins, and larger articles fit well into a cupboard under a bench.

Storage for soiled clothes often becomes a problem. One idea is a stand with three or four open-weave bags attached. Soiled clothes as they accumulate are sorted into the bags which can be loaded as they are into the washing machine or the contents easily removed for washing by other methods. In a two-storey house a chute which runs from bathroom or upstairs hall to the laundry is a labour-saving device, but do not try to make it too labour saving and have it opening directly above the tubs or clothes may get wet when that is not desired.

Lifting and stooping are minimised by a shelf or stool on which the clothes basket can stand. A refinement of this is a basket on wheels, like a tea trolley; a ramp at the door, a path to the clothes drier, and one of the worst jobs—carrying out the basket of wet clothes—is overcome.

Drying and Ironing

New Zealand weather is seldom so bad that indoor drying of clothes has to be resorted to for any length of time, but some way of drying and airing clothes under cover is very helpful. Lines on a frame which can be hauled with a pulley up to the ceiling and out of the way will be found very satisfactory. They can be put on a back veranda rather than in the laundry if desired. In cold or damp climates a small fuel heating stove in the laundry is very useful for drying wet working clothes and drying and airing the washing. For airing, most families find the sun, the rack, and the hot water cupboard adequate, but it is possible to fit up a special ventilated cupboard with a low-powered electric heating element installed at the bottom for this purpose.

If the room has a concrete floor, a mat or wooden platform should be provided for the worker to stand on. Linoleum, attached with a waterproof cement, is suitable for the laundry which tends toward kitchen uses, but not so satisfactory for the room which has hard wear. A new product, asbestos tiles which can be laid directly on concrete, promises well for this use, but is not yet available in New Zealand.

When the laundry equipment has been satisfactorily installed most of the other uses will be taken care of by a well-planned storage wall. This can be designed with full-length cupboards, shelves, and upper and lower cupboard space to keep in order all the items which otherwise would be scattered round the room.

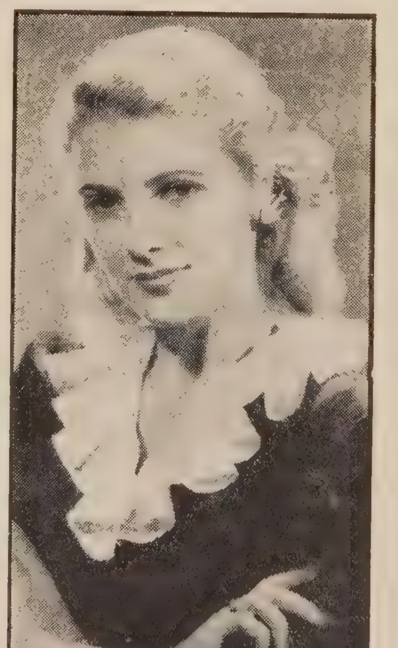
◆

A Cheerful Petal Collar

A SMALL amount of material—only a quarter of a yard—will make this very feminine petal collar to titivate a last year's woollen frock.

It is made in the following way: Cut out four circles each with a diameter of 8in. Make a hole about the size of a sixpence in the centre of each circle. This is the inside edge of the collar. Now cut each circle to the centre, opening out the rings of material into long strips.

Seam the four strips together, end to end, with very fine french seams. Press the seams well on the wrong side with a hot iron and a damp cloth. Roll the hem and stitch it finely, pressing the seam flat as the work proceeds, and then bind the neck edge with bias binding. Iron very carefully, pressing the bias binding flat.



COPYRIGHT PROVISIONS

The articles in the *Journal* of the Department of Agriculture of New Zealand are copyright. Proprietors of newspapers and periodicals wishing to republish matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the *Journal* should be addressed to the Editor, N.Z. Journal of Agriculture, Box 3004, Wellington.

◆

The New Zealand Journal of Agriculture

Volume 76, January-June, 1948

INDEX

January 1-112, February 113-208, March 209-320, April 321-416, May 417-512, June 513-624.

A

Adamson, N. J.—Replacement of Apple Trees on Moutere Hills Orchards, 356.
Agricultural Education and Research in Japan, 473.
Agricultural Workers, Minimum Rates of Wages Payable to, 292.
Allen, D. J., and Whittleston, W. G.—Mounting the Milking Machine Vacuum Pump, 246.
Allo, A. V.—Agricultural Education and Research in Japan, 473.
Animals, Domestic, Teeth Indicate Age and Feeding Habits of, 59.
Animals, Young, Rearing of, 545.
Apple Trees, Replacement of, on Moutere Hills Orchards, 356.
Armstrong, M. C.—Control of Diseases of Pregnant Ewes, 481.
Arthur, H. A.—Home-made Rope Maker, 593.

B

Baconer Pigs, New Zealand, Quality of, 425.
Baking Powder Breads, 95.
Baling Wire, Straightening, for Re-use, 488.
Barrer, P. R.—Clovers, 529.
Bates, E. M.—
  Harrowing of Pastures to Spread Droppings, 388.
  Treatment of Young Pastures, 474.
  Winter Spelling and Winter Grazing on the Dairy Farm, 477.
Bee Colonies, Preparing and Packing, for Transport, 541.
Beehive, Observation, How to Make and Use, 85.
Bell, J. E.—Improving Pastures in Auckland Province, 353.
Bishop, W. H.—Calf Scours Losses, 532.
Blackleg Disease in Sheep, 399.
Blake, G. A.—A Taranaki Gate that Swings, 14.
Bobby, F. C.—
  Feeding of Ducklings and Ducks, 163.
  Making the Best Use of Available Poultry Feed, 291.
  The Breeding and Rearing of Ducks, 31.
Bottling of Market Milk, 325.
Boysenberry Culture in Nelson Central, 363.
Bray, F. R.—A Survey of Rural Nelson and Marlborough, 49, 167.
Breads, Baking Powder, 95.
Breeding Sow, Making the Best Use of, 15.
Broad, C. E.—Spreading Fat and Solids in Milk Production, 375.
Broad, E. G.—Rearing and Training a Sheep Dog, 33.
Buddle, M. B.—Blackleg Disease in Sheep, 399.
Burgess, A. C.—*Carex comans*, 586.
Buttermaking, Commercial, Overrun in, 383.

C

Calf Scours Losses, 532.
Carex comans, 586.
Cereal Production Targets, 3.
Certification of Tested Seed Protects Buyer, 84.
Certified Seed, Pastures Grown from, 379.
Chamberlain, H. de O.—Combating Sand Invasion of Farmlands, 121.
Cheese Mites, Importance of Damage by, 385.
Chewings Fescue, 331.
Citrus Orchards at Kerikeri, Irrigation of, 161.
Citrus Orchards, Checking Soil Erosion in, 478.
Claridge, J. H.—
  Improved Timothy Strain, 224.
  Plant Hormone Inhibits Sprouting of Stored Potatoes, 494.
  Seed Production in New Zealand: The Grass and Clover Seed Industry, 231.
Clover and Grass Seed, Harvesting of, 47.
Clover and Grass Seed Industry, 231.
Clover Seeds, "Pelleted," for Surface Sowing Hill Country, 83.
Clover, Subterranean, in Canterbury Pastures, 293.
Clover, Subterranean, in Hawke's Bay, 241.
Clovers, 529.
Coil Winder, Portable, for Fencing Wire, 543.
Collar, Petal, 622.
Compost for the Home Garden, 237.
Cooking Centre, Kitchen, 109.
Cooking in a Pressure Saucepan, 314.
Costing Pig Meat Production, 285.
Cottage, a Four-roomed, Extending and Modernising, 619.
Cows, Feeding, to Avoid Milk Fever, 582.
Cramp, Light, for Assembling Hive Supers, 475.
Crested Dogstail, 431.
Cricket Pest in the North, Combating, 397.
Crochet Mat for Wagon or Tray, 208.
Crochet Table-mats, 112.
Crochet Work, First Steps in, 507.
Crosbie, C. J.—Tractor Inter-row Cultivators, 65.
Crutching of Sheep, 145.
Cultivators, Tractor Inter-row, 65.

D

Dairy Farm, Winter Spelling and Winter Grazing on, 477.
Dairy Herd, Macrocarpa Poisoning in, 178.
Dairy Industry Legislation, Committee Appointed to Investigate, 396.
Dams, Drag for Cleaning, 64.
Davies, E. B.—Mixing of Fertilisers for Single-dressing Applications, 271.
Davies, J. E.—Spread of Winged Thistle in Waikato Pastures, 540.
D.D.T. Dusting Machine, 46.
Dingwall, A. R.—Portable Coil Winder for Fencing Wire, 543.
Dipping Lameness in Sheep, Cause of, 420.
Dipping Sheep, Precautions Necessary in, 22.
Drag for Cleaning Dams, 64.
Dressmaking Patterns, Preparing and Adapting, 403.
Ducks and Ducklings, Feeding of, 163.
Ducks, Breeding and Rearing of, 31.
Duck, Woollen, for a Small Child, 408.
Duncan, J. E.—Precautions Necessary in Dipping Sheep, 22.

E

Eggers, H. W. T.—Lubrication, 217.
Everett, P.—
  Checking Soil Erosion in Citrus Orchards, 478.
  Irrigation of Citrus Orchards at Kerikeri, 161.
  Monstera deliciosa, 487.
Ewes, Pregnant, Control of Diseases of, 481.

F

Fabric Patterns from Linoleum Blocks, 613.
Faithful, W.—Seed Production in New Zealand: Chewings Fescue, 331.
Farming in New Zealand:
  Intensive Grassland Farming, 259, 563.
  North Auckland Peninsula, 457, 549.
Farm Work for February, 29; March, 159; April, 288; May, 392; June, 466; July, 562.
Federation of Young Farmers' Clubs, 220.
Fencing Wire, Portable Coil Winder for, 543.
Fertilisers, Mixing of, for Single-dressing Applications, 271.
Fertiliser Sowing Bag, 352.
Fertiliser Utilisation, Greater, Secured by Soaking and Coating Seeds, 230.
Fibre Supplies, Survey of World, 223.
Field-crop Competitions in Rotorua, 255.
Fix, W. J.—Grading of New Zealand Honey, 249.
Flock Management Can Influence Lambing Percentages, 179.
Flower Garden Notes, 101, 197, 304, 409, 501, 607.
Food and Agriculture Organization, Work of, 324.
Food Supplies, World Shortage of, 211.
Forster, I. W.—Preparing and Packing Colonies of Bees for Transport, 541.
Frankel, O. H., and Hullett, E. W.—Hilgendorf Wheat of Outstanding Baking Quality, 117.
Frankel, O. H.—WRI-Yielder Wheat, 221.
Frew, S.—Culture of Walnut Trees, 281.
Fruit Trees, Mineral Deficiencies of, 467.
Fruit Trees, Spur Pruning of, 581.

G

Galpin, A. J.—Drag for Cleaning Dams, 64.
Machine for Clearing Lupins on Sand Country, 287.
Gas Box, Use of, for Autumn Requeening of Hives, 130.
Gerring, J. C.—Feeding Cows to Avoid Milk Fever, 582.
Gillard, S. O.—Small Glasshouse for the Home Gardener, 371.
Glanville, E. B.—Farming in New Zealand: North Auckland Peninsula, 457, 549.
Glasshouse, Small, for the Home Gardener, 371.
Grainger, A. R.—Spur Pruning of Fruit Trees, 581.
Grass and Clover Seed, Harvesting of, 47.
Grass and Clover Seed Industry, 231.
Grass Seed, Weed Seeds in, 213.

H

Haddon, S. G.—Design of Poultry Incubator Rooms, 445.
Poultry Farm Food Stores, 527.
Hadfield, W. V.—Small Seeds and Cropping on a Wairarapa Farm, 365.
Handbags, Two Unusual Designs for, 510.
Harbord, W. L., and Thomson, G. A.—Winter Feeding of Stock in Southland, 421.
Harrowing of Pastures to Spread Droppings, 388.
Hilgendorf Wheat, 117, 181.
Hill, R. P.—Subterranean Clover in Hawke's Bay, 241.
Hitchcock, J. H.—Crutching of Sheep, 145.
Hive Boxes and Frames, Steam and Water Steriliser for, 398.
Hive Supers, Light Cramp for Assembling, 475.
Hogg, D. J.—Boysenberry Culture in Nelson Central, 363.
Home Garden Notes, 17, 141, 225, 337, 449, 583.
Honey, Grading of, 249.
Hopkirk, Dr. C. S. M.: Appointment as Veterinary Officer in London, 186.
House, Adapting a, to the Needs of the Family, 313.
Hudson, J. P.—
  Flower Garden Notes, 101, 197, 304, 409, 501, 607.
  Small Fruit Notes, 257.
  Tulip Culture, 595.
Hull, D.—Overrun in Commercial Buttermaking, 383.
Hullett, E. W., and Frankel, O. H. Hilgendorf Wheat, 117.
Hydrochloric Acid, Seed Extraction with, 480.

I

Incubation Rooms, Poultry, Design of, 445.
Inoculation of Lucerne Seed, 465.
Irrigation Farming in the United States, 343.
Irrigation of Citrus Orchards at Kerikeri, 161.
Irrigation Research in Canterbury, 323.

J

Johnson, Dorothy—
  Adapting a House to the Needs of the Family, 313.
  Extending and Modernising a Four-roomed Cottage, 619.

K

Kennelly, A. G.—Home Garden Notes, 17, 141, 225, 337, 449, 533.
Kitchen, Altering a Large, Inconvenient, 506.
Kitchen Cooking Centre, 109.
Kitchen Facilities, 319.
Kitchen, Making the, Convenient and Efficient, 415.
Kitchen, Modernising an Old, 511.
Kitchen, Place in the, for Making and Baking, 205.
Kitchen, Useful Facts and Figures for the, 201.

L

Laing, A. D. M. G.—Flock Management Can Influence Lambing Percentages, 179.
Lambing Estimates for 1947, 82.
Lambing Percentages, Flock Management Can Influence, 179.
Lambs for the Works, Handling of, 286.
Lamont, N.—
  Development of Irrigation Farming in the United States, 343.
  Multi-purpose Development of America's Water Resources, 441.
Laundry Layout, 621.
Lawn Edge, Repairing a, 502.
Lawn, Establishment and Maintenance of, 295.
Leitch, C. C.—Making the Best Use of Pastures Grown from Certified Seed, 379.
Lime Loader, Home-constructed Mechanical, 176.
Lime Transport Assistance, 4.
Liming, Cheap Co-operative, in Warkworth, 479.
Linoleum Blocks, Fabric Patterns from, 613.
Linseed Oil Production in New Zealand, 359.
Lithgow, A. V.—Certification of Tested Seed Protects Buyer, 84.

- Litter Production, Good, Importance of, 587.
- Livestock, Care of, During May, 381; June, 493; July, 591.
- Longwill, A., and McMeekan, C. P.—Quality of New Zealand Baconer Pigs, 425.
- Longwill, A.—
  - Importance of Good Litter Production, 587.
  - Improvements in the Housing of Pigs, 273.
  - Making the Best Use of the Breeding Sow, 15.
  - Planning Necessary to Make Use of Whey as Pig Food, 187.
  - Planning Pig Production for the Dairy Farm, 489.
  - Trends in Production in the Pig Industry, 393.
  - Wastage of Whey that Could be Used as Pig Food, 89.
- Lubrication, 217.
- Lucerne Seed, Inoculation of, 465.
- Lyall, A. E.—Inoculation of Lucerne Seed, 465.
- Lynch, A. J.—
  - Sacks and Plaster Used to Make Shed, 592.
  - Surface Seeding of Pastures, 279.

M

- McKechnie, A.—Compost for the Home Garden, 237.
- McLeod, A. M.—Macrocarpa Poisoning in Dairy Herd, 178.
- McMeekan, C. P., and Longwill, A.—Quality of New Zealand Baconer Pigs, 425.
- McNab, Edith G.—Preparing and Adapting Dressmaking Patterns, 403.
- Macrocarpa Poisoning in Dairy Herd, 178.
- Manuka, Control of, in the King Country, 583.
- Market Milk, Bottling of, 325.
- Market Milk, Collection and Processing of, 5.
- Market Milk, Control and Delivery of, 435.
- Marlborough and Nelson, Survey of Rural, 59, 167.
- Marryatt, E. R.—Weed Seeds in Grass Seed, 213.
- Marshall, D.—Teeth Indicate Age and Feeding Habits of Domestic Animals, 59.
- "Mary"—
  - A Magnificent Gift, 601.
  - "Flowery, Green, Bird-singing Land," 495.
  - "He Who Helps a Crippled Child . . .," 93.
  - "Lyrical Spiral, Lighted Whorl," 192.
  - Save the Children, 401.
  - The Bee Tree, 303.
- Meteorological Records for April, 420; May 526.
- Metson, Norma K.—
  - Kitchen Facilities, 319.
  - Laundry Layout, 621.
  - Making the Kitchen Convenient and Efficient, 415.
  - Modernising an Old Kitchen, 511.
  - Place in the Kitchen for Making and Baking, 205.
  - The Kitchen Cooking Centre, 109.
- Milk Fever, Feeding Cows to Avoid, 582.
- Milking Machine Vacuum Pump, Mounting, 246.
- Milking Shed, Good and Bad Habits in the, 369.
- Milk Production, Spreading Fat and Solids in, 375.
- Miller, D.—Control of St. John's Wort by Imported Beetle, 351.
- Mineral Deficiencies of Fruit Trees, 467.
- Minister of Agriculture, Statements by, 3, 115, 211, 323, 419, 515.
- *Monstera deliciosa*, 487.
- Moutere Hills Orchards, Replacement of Apple Trees on, 356.
- Mullins, J.—Rearing Young Farm Animals, 545.

N

- Nelson and Marlborough, Survey of Rural, 49, 167.
- Nottage, I. L.—
  - Care of Orchard Equipment, 517.
  - Neat Vases Made from Old Shell-cases, 610.

O

- Observation Beehive, How to Make and Use, 85.
- Oils and Fats, World Shortage of, 515.
- Orchard Equipment, Care of, 517.
- Orchard, Maintaining Soil Fertility in the, 389.
- Overrun in Commercial Buttermaking, 383.

P

- Parcels, Packing, for Overseas, 406.
- Pastures Grown from Certified Seed, 379.
- Pastures, Harrowing of, to Spread Droppings, 388.
- Pastures, Improving, in Auckland Province, 353.
- Pastures, Improving, in Otago and Southland, 523.
- Pastures, Surface Seeding of 279.
- Pastures, Young, Treatment of, 474.
- Paterson, C. R.—A Light Cramp for Assembling Hive Supers, 475.
- Patterns, Dressmaking, Preparing and Adapting, 403.
- Pear Tree a Century and a Quarter Old, 258.
- Pedigree Sow Records, 272, 588.
- "Pelleted" Clover Seeds for Surface Sowing Hill Country, 83.
- Perry, E. J.—Steam and Water Steriliser for Hive Boxes and Frames, 398.
- Petal Collar, 622.
- Phormium Industry, Encouragement of the, 419.
- Picnic Bag for the Car, 98.
- Picnic Fare, 194.
- Pig Food, Wastage of Whey that Could be Used as, 89.
- Pig Food, Whey as, 187.
- Pig Industry, Trends of Production in the, 393.
- Pig Litters, Increasing the Weights of, 289.
- Pig Meat Production, Costing of, 285.
- Pig Production, Planning, for the Dairy Farm, 489.
- Pigs, Improvements in the Housing of, 273.
- Pinafores, Plastic, 311.
- Plant Hormone Inhibits Sprouting of Stored Potatoes, 494.
- Plastic Pinafores, 311.
- Potatoes Need not be the Dull Part of a Meal, 496.
- Potatoes, Sprouting of Stored, Inhibited by Plant Hormone, 494.
- Poultry Farm Food Stores, 527.
- Poultry Feed, Making the Best Use of, 291.
- Poultry Incubator Rooms, Design of, 445.
- Pressure Saucepan, Cooking in, 314.
- Procter, C. H.—Seed Extraction with Hydrochloric acid, 480.

R

- Rabbit Nuisance Amendment Act, 178.
- Renouf, L. R.—Maintaining Soil Fertility in the Orchard, 389.
- Requeening of Hives, Use of a Gas Box for, 130.
- Research Work, Co-operative, with the Farmer, 115.
- Robertson, Phyllis L.—Importance of Damage by Cheese Mites, 385.
- Robinson, D. S.—How to Make and Use an Observation Beehive, 85.
- Rope Maker, Home-made, 593.
- Ross, W. D.—Stock Losses from Transit Tetany, 519.

S

- Sacks and Plaster Used to Make Shed, 592.
- St. John's Wort, Control of, by Imported Beetle, 351.
- Sand Invasion of Farmlands, 121.
- Sawbench, Portable Tractor, 92.
- Saxby, S. H.—Order in the Farm Workshop, 374.
- Scone Mixture for a Variety of Dishes, 602.
- Seed, Certification of Tested, Protects Buyer, 84.
- Seed Extraction with Hydrochloric Acid, 480.
- Seed, Grass and Clover, Harvesting of, 47.
- Seed Industry, The Grass and Clover, 231.
- Seed Potato Certification, 430.
- Seed Production in New Zealand:
  - Chewings Fescue, 331.
  - Crested Dogstail, 431.
  - The Grass and Clover Seed Industry, 231.
- Seeds, Soaking and Coating of, Secure Greater Fertiliser Utilisation, 230.
- Shed Made from Sacks and Plaster, 592.
- Sheep, Blackleg Disease in, 399.
- Sheep, Cause of Dipping Lameness in, 420.
- Sheep, Crutching of, 145.
- Sheep Dipping, Precautions Necessary in, 22.
- Sheep Dog, Rearing and Training a, 33.
- Shelter Planting, Tree Stocks for, 133, 251.
- Smallfield, P. W.—Farming in New Zealand: Intensive Grassland Farming, 259, 563.
- Small Fruit Notes, 257.
- Small Fruits, Equipment for Spraying, 83.
- Small Holding of Sub-tropical Fruits, 559.
- Small Seeds and Cereal Cropping on a Wairarapa Farm, 365.
- Smith, D. M.—Increasing the Weights of Pig Litters, 289.
- Smith, E. G.—
  - Harvesting of Grass and Clover Seeds, 47.
  - Subterranean Clover in Canterbury Pastures, 293.
- Soil Erosion, Checking, in Citrus Orchards, 478.
- Soil Fertility, Maintaining, in the Orchard, 389.
- Sow, Breeding, Making the Best Use of, 15.
- Spraying Small Fruits, Equipment for, 183.
- Spreading Fat and Solids in Milk, 375.
- Sprouting of Stored Potatoes Inhibited by Plant Hormone, 494.
- Spur Pruning of Fruit Trees, 581.
- Stainton, E. G.—
  - A Fertiliser Sowing Bag, 352.
  - Control of Manuka in King Country, 583.
  - Home-made Concrete Water Trough, 378.
- Steriliser, Steam and Water, for Hive Boxes and Frames, 398.
- Stockdill, S. M. J.—Linseed Oil Production in New Zealand, 359.
- Stuart, A.—
  - Improving Pastures in Otago and Southland, 523.
  - Seed Production in New Zealand: Crested Dogstail, 431.
- Subterranean Clover in Canterbury Pastures, 293.
- Subterranean Clover in Hawke's Bay, 241.
- Sub-tropical Fruits, A Small Holding of, 559.
- Surface Seeding of Pastures, 279.
- Sutherland, M.—Growing Tree Stocks for Shelter Planting, 133, 251.
- Sweets, Cold, for Hot Weather, 107.
- Sydenham, F.—Establishment and Maintenance of a Lawn, 295.
- Syme, P. S.—
  - A Portable Tractor Sawbench, 92.
  - Cheap Co-operative Liming in Warkworth, 479.
  - Combating Cricket Pest in the North, 397.
  - Home-constructed Mechanical Lime Loader, 176.
  - Straightening Baling Wire for Re-use, 488.

T

- Table-mats, Crochet, 112.
- Taranaki Gate that Swings, 14.
- Taylor, C. R.—Rotorua District Field-crop Competitions, 255.
- Teeth Indicate Age and Feeding Habits of Domestic Animals, 59.
- Thomson, G. A., and Harbord, W. L.—Winter Feeding of Stock in Southland, 421.
- Tilsley, Louise—Fascinating Fabric Patterns from Linoleum Blocks, 613.
- Timothy Strain, Improved, 224.
- Topping, Eva—
  - Altering a Kitchen, 506.
  - A Picnic Bag for the Car, 98.
  - Cold Sweets for Hot Weather, 107.
  - First Steps in Crochet Work, 501.
  - Picnic Fare, 194.
  - Quick and Varied Cooking in a Pressure Saucepan, 314.
  - Scone Mixture for a Variety of Dishes, 602.
- Toys, Easy-to-make, for a Girl and Boy, 309.
- Tractor Inter-row Cultivators, 65.
- Transit Tetany, Stock Losses from, 519.
- Tree Stocks for Shelter Planting, 133, 251.
- Tulip Culture, 595.
- Twomey, T. P. J.—
  - Control and Delivery of Market Milk, 435.
  - The Bottling of Market Milk, 325.
  - The Collection and Processing of Market Milk, 5.

U

- Unwin, Eirene—
  - Baking Powder Breads, 95.
  - Packing Parcels for Overseas, 406.
  - Potatoes Need not be the Dull Part of a Meal, 496.
  - Useful Facts and Figures for the Kitchen, 201.

V

- Vacuum Pump, Milking Machine, Mounting the, 246.
- Vases Made from old Shell-cases, 610.
- Veterinary Science Bursaries, 488.
- Viney, R.—Mineral Deficiencies of Fruit Trees, 467.

W

- Walnut Trees, Culture of, 281.
- Walsh, R. S.—Use of a Gas Box for Autumn Requeening of Hives, 130.
- Waterfowl, Banding of, 370.
- Water Resources, America's, Multi-purpose Development of, 441.
- Water Trough, Home-made Concrete, 378.
- Watt, J. H.—Equipment for Spraying Small Fruits, 183.
- Watts, A. T. J.—
  - A Small Holding of Sub-tropical Fruits, 559.
- Weed Seeds in Grass Seed, 213.
- Wheat Growers' Aid for Britain, 216.
- Wheat, Hilgendorf, 117, 181.
- Wheat, WRI-Yielder, 221.
- Whey as Pig Food, 187.
- Whey that Could be Used as Pig Food, Wastage of, 89.
- Whitten, L. K.—Cause of Dipping Lameness in Sheep, 420.
- Whittleston, W. G. and Allen, D. J.—Mounting the Milking Machine Vacuum Pump, 246.
- Whittleston, W. G.—Good and Bad Habits in the Milking Shed, 369.
- Winged Thistle, Spread of, in Waikato Pastures, 540.
- Winter Feeding of Stock in Southland, 421.
- Winter Spelling and Winter Grazing on the Dairy Farm, 477.
- Woollen Duck for a Small Child, 408.
- Workshop, Farm, Order in the, 374.
- WRI-Yielder Wheat, 221.

Y

- Young Farmers' Clubs Federation, Aims and Organisation of, 220.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—25110

KEEP UP THAT FLOW OF

BUTTER *to* BRITAIN

WHERE BRITAIN STANDS WE STAND

ISSUED BY THE AID FOR BRITAIN NATIONAL COUNCIL

BEST *for calves*

because

1 TOMOANA CALF PELLETS are standardised ounce by ounce and pellet by pellet — there is no danger of the heavier ingredients sifting to the bottom of the bag.

2 They are the most convenient feed — no need to mix the meal into a porridge, you just throw them into the calf bucket.

3 They help to get the calves' digestive organs used to solids at an earlier age, and get them right ahead earlier on pasture.

4 They bear the Tomoana brand name of guaranteed quality.

TOMOANA *Calf* PELLETS

Further information from . . .
W. & R. FLETCHER (N.Z.) LTD.,
G.P.O. Box 663 — Wellington

Order From Your Merchant To-day